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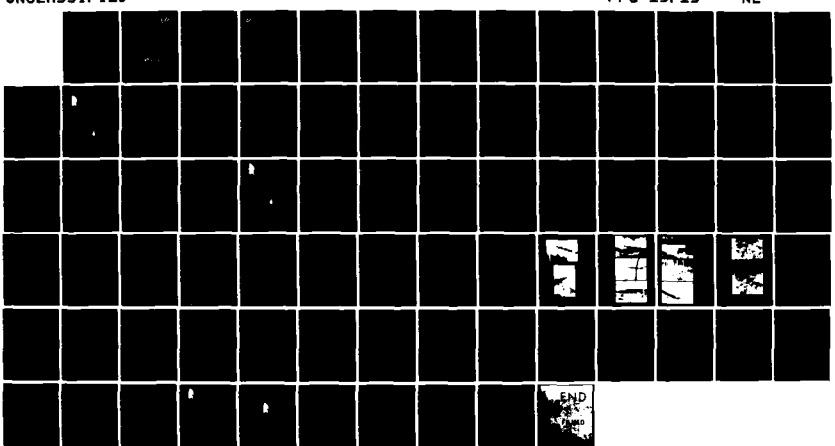

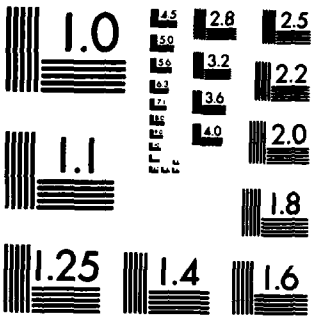

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HOUSATONIC RIVER BASIN
GREAT BARRINGTON, MASSACHUSETTS

LONG POND DAM
MA 00024

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FEBRUARY 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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4. TITLE (and Subtitle) Long Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Great Barrington, Massachusetts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is an earth embankment about 240 ft. long with a vertical concrete core wall and a height of 15.4 feet, and maximum storage capacity at top of dam of about 700 acre feet. The dam is in FAIR condition. The area tributary to this SMALL size, SIGNIFICANT hazard dam is moutainous to rolling, generall well forested, with an area of about 580 acres.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

NOV 14 1980

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the Long Pond Dam (MA-00024) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Housatonic Water Company, Great Barrington, Mass.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely,

WILLIAM E. HODGSON, JR.
Colonel, Corps of Engineers
Acting Division Engineer

Incl
As stated

LONG POND DAM

MA 00024

HOUSATONIC RIVER BASIN
GREAT BARRINGTON, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	MA 00024
Name of Dam:	Long Pond Dam
Town:	Great Barrington
County and State:	Berkshire County, Massachusetts
Stream:	Long Pond Brook
Date of Inspection:	November 14, 1979

BRIEF ASSESSMENT

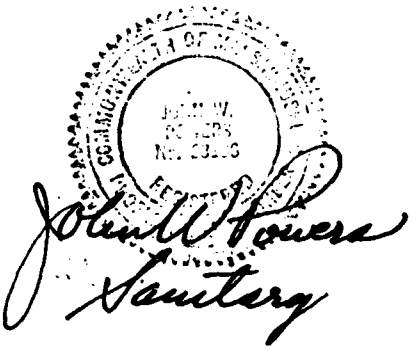
Long Pond Dam is located on Long Pond Brook about two (2.0) miles above Green River, a tributary of the Housatonic River in Great Barrington, Massachusetts. The dam is an earth embankment about 240 feet long with a vertical concrete core wall and a height of 15.4 feet, and maximum storage capacity at top of dam of about 700 acre feet. A concrete spillway with a crest length of 9.6 feet and a road bridge overhead is located in the right abutment; an 8-inch cast iron pipe drain near the center of the dam; one 10-inch cast iron water supply intake left of the dam center, and a second 14-inch cast iron water supply intake passes the left abutment. Water treatment facilities are located downstream of the left end of the dam. The pipe outlets are controlled by gate valves.

The dam is in FAIR condition. The embankment is stable with no visible leakage. The dam top is not at a uniform elevation and a few protective stones on the upstream face have fallen into the reservoir. Trees and shrubs are growing in the downstream slope of the dam. The spillway is in fair condition, but a stop log has been used to raise reservoir level for water works purposes and the approach channel retaining wall is tilting into the channel.

Downstream hazards due to failure of the dam involve washout of two public roads, damage to several school buildings and the possible loss of few, if any, lives. The area tributary to this SMALL size, SIGNIFICANT hazard dam is mountainous to rolling, generally well forested, with an area of about 580 acres (0.90 square miles). The spillway and dam are adequate for 100 year frequency (1% probability) storm runoff though there would be little freeboard protection against wave action. A storm runoff of half probable maximum flood would raise the reservoir to about 0.9 feet above the top of the dam, assuming that the dam remained.

It is recommended that within one year the dam be brought to a uniform height, that facing stone be replaced, and trees and shrubs be removed from the downstream face of the embankment. The use of stop logs at the spillway should be discontinued and the spillway channel retaining wall should be stabilized.

Regular dam inspections and reports should be made and an emergency flood warning system developed.



John W. Powers
Massachusetts Registration 23106

This Phase I Inspection Report on Long Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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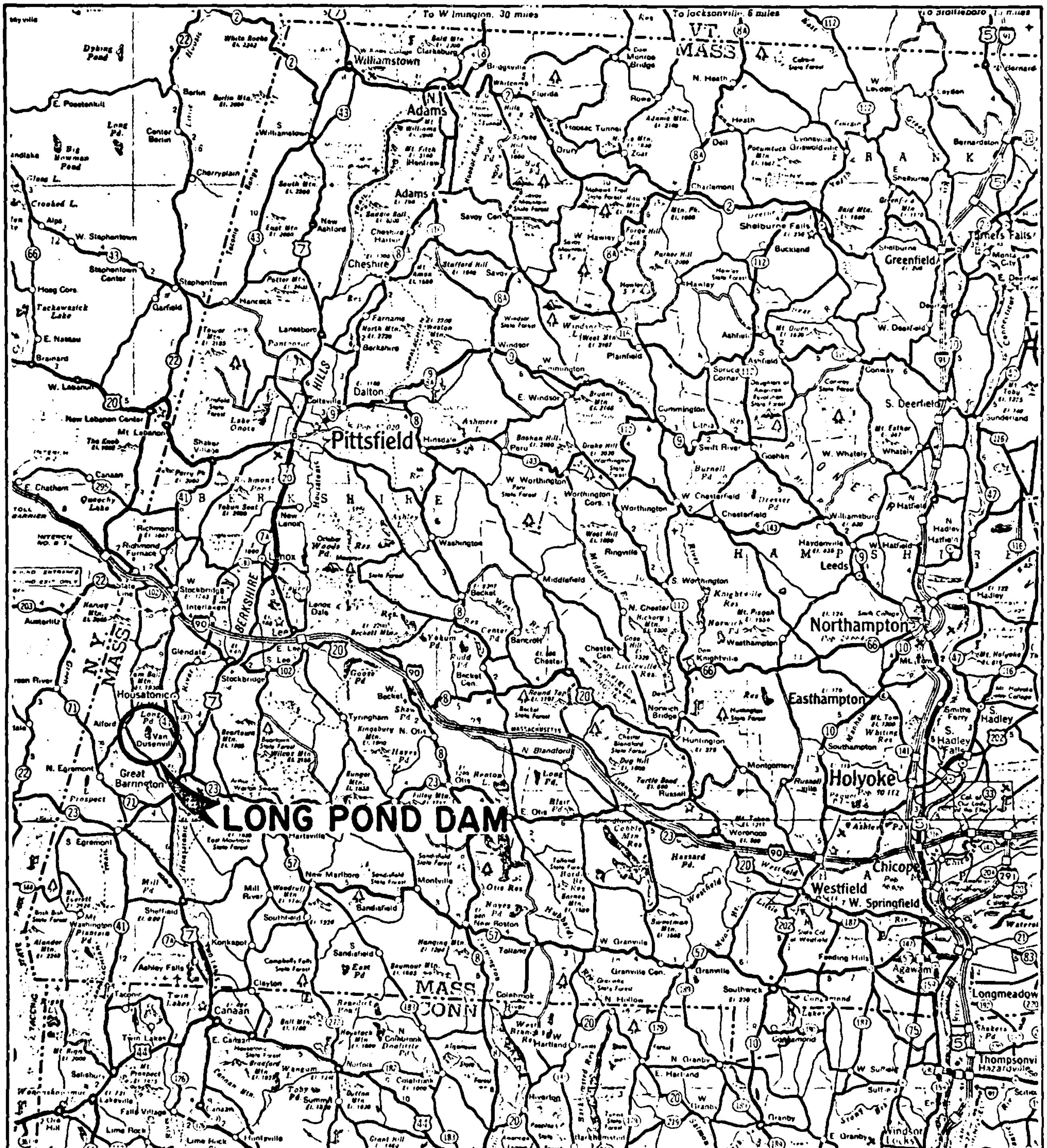

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

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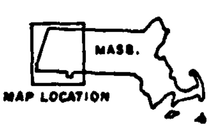
SCALE IN MILES



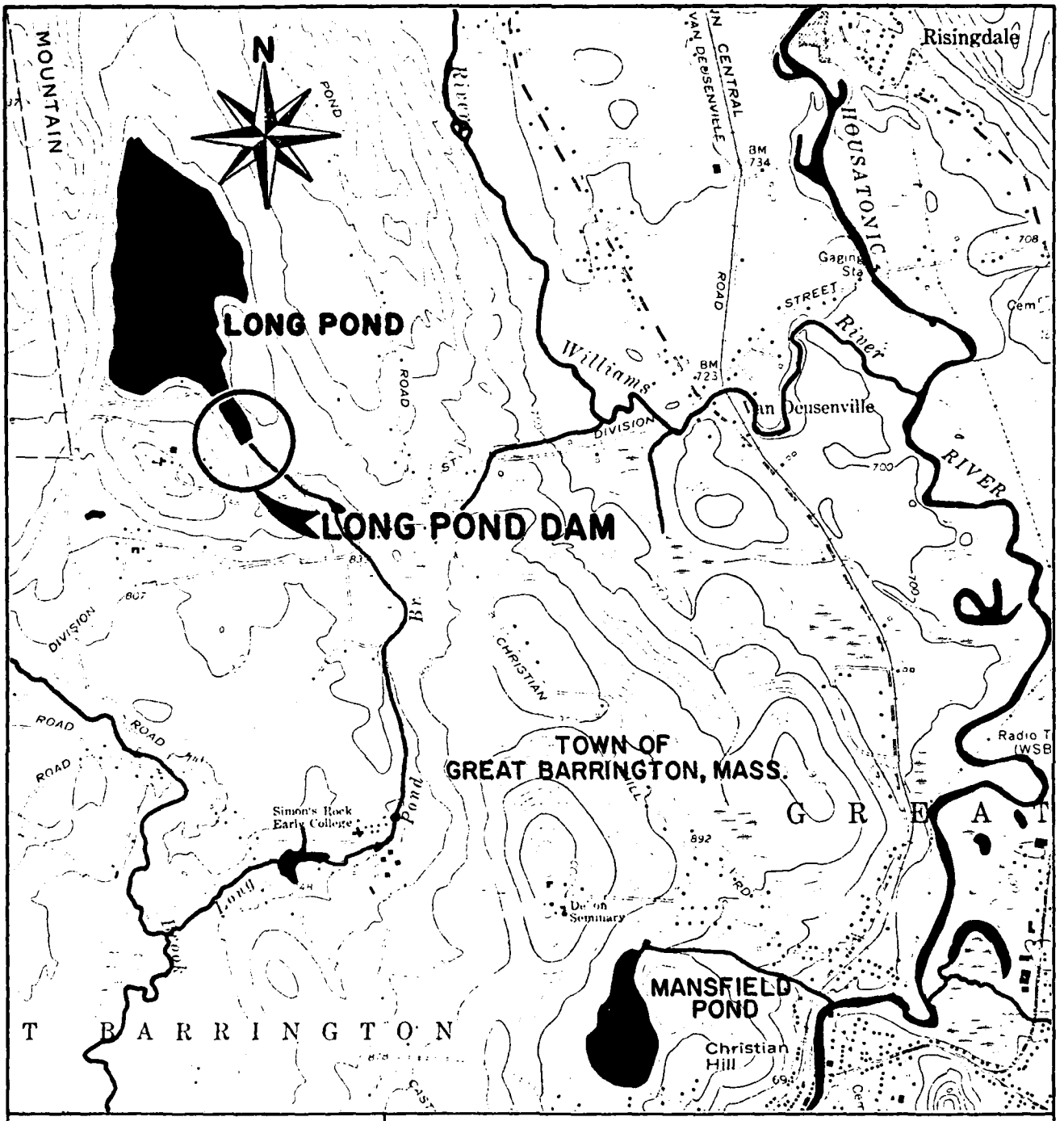
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN I

LONG POND DAM (MA 00024) GREAT BARRINGTON
BERKSHIRE COUNTY MASSACHUSETTS

SCALE: AS NOTED

DATE: FEBRUARY 1980



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FROM: U.S.G.S. EGREMONT, AND GREAT BARRINGTON, MASS. QUADRANGLE MAPS

QUADRANGLE LOCATION

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCUS PLAN 2

LONG POND DAM (MA 00024)
BERKSHIRE COUNTY

GREAT BARRINGTON
MASSACHUSETTS

SCALE: AS NOTED

DATE: FEBRUARY 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

LONG POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

(a) Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Tighe & Bond/SCI has been retained by the New England Division to inspect and report on selected dams in Massachusetts. Authorization and notice to proceed were issued to Tighe & Bond/SCI under a letter of October 24, 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW 33-80-C-0005 has been assigned by the Corps of Engineers for this work.

(b) Purpose

1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

3) Update, verify, and complete the National Inventory of Dams.

(c) Scope

The program provides for the inspection of non-federal dams in the high hazard potential category based upon location of the dams, and those dams in the significant hazard potential category believed to represent an immediate danger based on condition of the dams.

1.2 Description of Project

(a) Location

Long Pond Dam is located on Long Pond Brook about 2 miles above its confluence with Seekonk Brook which flows about 4,000

feet further to Green River, a tributary of the Housatonic River in Great Barrington, Massachusetts. The dam is about 2,000 feet north of Division Street at a point about 1.0 mile west of Van Deusenville which is about 2.5 miles north along Route 41 from the center of Great Barrington. Customary access is gained via a road north of Division Street about 1.8 miles west of Van Deusenville that circles a hill for about 1.1 mile to the dam site. The dam is located on the U.S.G.S. Egremont, Massachusetts quadrangle at latitude N-42°-13'-32" and longitude W-73°-23'-16". (See Locus Plan).

(b) Description of Dam and Appurtenances

The dam consists of an earth embankment about 240 feet long and 15.4 feet high. There is a spillway in the right abutment and a drain near the center as shown on the sketches in Appendix B.

1) Embankment

The embankment has a road at the top about 13 feet wide with a vertical stone face about 2.5 feet high on the upstream face. The downstream slope extends about 79 feet from the upstream face of the top of the dam. An 8-inch diameter cast iron drain with gate valve control is located near the center of the embankment. The elevation of the top of the dam varies about 0.6 feet from one point to another. The top of the dam was found to be about 1.7 feet above the top of the stop log at the time of the inspection, and about 2.5 above concrete spillway crest. There is reported to be a vertical concrete core wall near the center of the road running the length of the dam.

A 14-inch water supply pipe is laid around the left abutment from an intake at an old dam now submerged about 800 feet north of the present dam. A second 10-inch cast iron intake passes through the dam and core wall a few feet left (east) of the pond drain. A single gate valve in the downstream embankment controls both intakes for water supply purposes. Slow sand filters, an aeration basin, control building and pump house are located south of the left end of the dam.

2) Spillway

A concrete spillway and bridge are located in the right abutment. The spillway crest is a rectangular concrete sill seven (7) inches above the discharge chute downstream of the bridge with an 8-inch wide flat top. The crest length is 9'-7" between the concrete abutments of the bridge. The approach channel abuts a concrete retaining wall along the right abutment. The outflow channel is an unlined channel in the hill slope at the right of the embankment. The road crosses the spillway on a concrete bridge deck on steel beams.

(c) Size Classification

The dam's maximum impoundment at the top of dam of 700 acre feet and structural height of 15.4 feet places it in the SMALL size classification.

(d) Hazard Classification

The hazard potential classification for this dam is SIGNIFICANT because of the economic losses and potential loss of life downstream which may occur in the event of dam failure. Most notably, a road one half mile downstream and two or three school buildings and a road one and a quarter miles downstream of the dam would incure damage due to shallow flooding. Few, if any, lives would be lost as a result of dam failure.

(e) Ownership

The owner of the dam is:

Housatonic Water Company
P.O. Box 299, 406 Main Street
Great Barrington, Massachusetts 01230
Tel.: 413-528-1111

(f) Operator

The dam and water supply facility operator is:

Mr. Harold O'Brien
10 North Street
Great Barrington, Massachusetts 01230
Tel.: 413-528-1780; or 413-528-1111

(g) Purpose

The purpose of the dam is water supply storage for the Village of Housatonic, Massachusetts.

(h) Design and Construction History

No information on design and construction is available.

It was reported that the spillway and bridge were reconstructed about five years ago; signs of recent reconstruction of these features were evident during our inspection.

The Massachusetts Department of Public Works, Division of Waterways inspection report for October 5, 1976 noted no deficiencies.

(i) Normal Operation Procedure

Normal operation of the dam is in conjunction with the operation of slow sand filters for water supply purposes. These filters are attended, adjusted, and maintained daily. A stop log consisting of a 2-inch x 10-inch plank has been installed in the spillway to raise the reservoir to provide additional storage for water supply purposes. Normally the dam is self regulating with the reservoir at spillway elevation.

1.3 Pertinent Data

(a) Drainage Area

The drainage area for Long Pond dam covers about 580 acres (0.90 square miles) bounded on the west and northeast by steep mountains and on the north and southeast by rolling hills, and a small hill to the south. All except about 35 acres are densely wooded. Runoff from this watershed would be concentrated quickly with no lowlands or swamps to attenuate storm runoff. There are no significant streams concentrating water into the reservoir.

(b) Discharge at Dam Site

1) Outlet Works

Normal discharge from the dam is via the water supply pipeline and the spillway. The water supply intakes consist of a 10-inch cast iron pipe through the dam and core wall into the reservoir about 5 to 8 feet below normal water level and a 14-inch cast iron pipe line that runs along the left bank of the reservoir to an old dam, now submerged, about 800 feet north of this dam. There is a normally open submerged gate valve at the inlet end of each water supply inlet and one gate valve in the downstream embankment that controls water supply from both inlets to the filter works and the distribution system.

The spillway is a concrete structure located in the right abutment of the dam. The spillway crest is a rectangular concrete sill seven (7) inches above the discharge chute downstream of the bridge and an 8-inch wide flat top. The crest length is 9'-7" between the concrete abutments of the bridge overhead. The approach channel lies against a concrete wall retaining the right abutment earth. The outflow channel is a stony channel in the hill slope at the right of the embankment. The road crosses the spillway on a concrete deck bridge on steel beams.

There is also an 8-inch cast iron pipe pond drain near the center of the embankment that passes through the dam and core wall. There is a gate valve in the downstream embankment controlling the drain discharge.

2) Maximum Known Flood

There is no known record for the maximum flood inflow or outflow at this site.

3) Ungated Spillway Capacity at Top of Dam

The capacity of the spillway above the elevation of the stop logs (890 feet MSL, NGVD) to the top of the embankment (891.7 feet MSL, NGVD) is 77 cfs.

4) Ungated Spillway Capacity at Test Flood

The capacity of the ungated spillway with the reservoir at test flood evevation (892.4 MSL) and flashboards in at elevation 890 MSL, NGVD is 219 cfs.

5) Gated Spillway Capacity at Normal Pool

The capacity of the spillway above the fixed concrete crest (elevation 889.2 feet MSL, NGVD) to normal pool elevation (890.0 feet MSL, NGVD) is 25 cfs.

6) Gated Spillway Capacity at Test Flood

The capacity of the spillway above the fixed concrete crest (elevation 889.2 feet MSL, NGVD) to test flood elevation (892.4 feet MSL, NGVD) is 331 cfs.

7) Total Spillway Capacity at Test Flood

The total spillway capacity above spillway crest elevation (889.2 feet MSL, NGVD) to test flood (892.4 feet MSL, NGVD) with no flashboards is 331 cfs, assuming the dam remains intact.

8) Total Project Discharge at Top of Dam

Total project discharge with no flashboards or water works discharge and water at top of dam elevation (891.7 feet MSL, NGVD) is 142 cfs.

9) Total Project Discharge at Test Flood

Total project discharge via spillway and drain with no flashboards or water works discharge and pond at test flood elevation (892.4 feet MSL, NGVD) is 336 cfs, assuming the dam remains intact.

(c) Elevation (ft. above MSL, NGVD)

(1) Streambed at toe of dam: 875.5

(2) Bottom of cutoff: Unknown

(3) Maximum tailwater: Unknown

(4) Normal pool: Not applicable

(5) Full flood control pool: Not applicable

(6) Spillway crest (gated): 890.0

(7) Design surcharge : Unknown

(8) Top of dam: 891.7

(9) Test flood surcharge: 892.4

(d) Reservoir (Length in feet)

(1) Normal pool: 4,400 ft.

(2) Flood control pool: Not applicable

(3) Spillway crest pool: 4,376 ft.

(4) Top of dam: 4,450 ft.

(5) Test flood pool: 4,450 ft.

(e) Storage (acre-feet)

(1) Normal pool: 567 Ac. ft.

(2) Flood control pool: Not applicable

(3) Spillway crest pool: 520 Ac. ft.

(4) Top of dam: 700 Ac. ft.

(5) Test flood pool: 750 Ac. ft.

(f) Reservoir Surface (acres)

(1) Normal pool: 109 Ac.

(2) Flood-control pool: Not applicable

(3) Spillway crest: 106 Ac.

(4) Test flood pool: 118 Ac.

(5) Top of dam: 116 Ac.

(g) Dam

(1)	Type:	Earth embankment
(2)	Length:	240 ft.
(3)	Height:	15.4 ft.
(4)	Top Width:	13 ft.
(5)	Side Slopes:	Upstream: 2±:1; Downstream: 1½:1 to 9:1
(6)	Zoning:	Unknown
(7)	Impervious Core:	Concrete
(8)	Cutoff:	Concrete
(9)	Grout curtain:	Unknown
(10)	Other:	

(h) Diversion and Regulating Tunnel

Not applicable

(i) Spillway

(1) Type: Flat top square concrete crest

(2) Length of weir: 9.7 ft.

(3) Crest elevation (with and without flash guards):
with flashboard: 890.0; without flashboard: 889.2

(4) Gates: None

(5) U/S Channel: Unlined earth with concrete retaining wall at right side.

(6) D/S Channel: Concrete lined chute under bridge then unlined rocky channel

(7) General: Bridge clearance 4.5'

(j) Regulating Outlets

(1) Invert: 876.3

(2) Size: 8-inch diam.

(3) Description: 8-inch C.I. pipe drain

(4) Control Mechanism: 8-inch gate valve

(5) Other: 10-inch C.I. pipe water supply intake
10-inch gate valve control

SECTION 2 - ENGINEERING DATA

2.1 Design

No information is available on the design of this dam.

2.2 Construction

No information is available on the construction of this dam.

2.3 Operation

Principal operating effort is directed to the operation of the water supply intake and filter. A 2-inch x 10-inch plank has been laid across the spillway to provide increased storage for water supply. The water supply intake valves and pond drain valves have been operated on rare occasions to check their operability and to allow repair of facilities.

2.4 Evaluation

No engineering information is available on the design or construction so no evaluation of adequacy of design or construction can be made. Observation of the dam and its history of performance indicates that design and construction were adequate. Since there is no information on the material used for embankment construction, no further evaluation can be made.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

(a) General

Long Pond Dam was in FAIR condition at the time of the inspection.

(b) Dam (See photos in Appendix C)

The earth embankment was found to be in fair condition. The elevation of the top varies by about 0.6 feet between the highest elevation and the lowest elevation (other than the spillway bridge and approach). Three or four of the stones forming the upstream face of the top have collapsed into the pond leaving a ragged edge with no protection for the gravel and sod backup. The gravel road is in fair condition. The concrete core wall was not exposed at any location.

The downstream slope is protected with a good growth of sod. Some trees and shrubs are growing in the embankment, close to the top of dam. There is a large earth embankment along the downstream slope that supports sand filters for the water supply and general embankment support. The nature of the material in this bank and the reason for installing the portion that is not related to water supply facilities is unknown.

No cracking, settlement or seepage were observed. No trails or signs of trespass or vandalism were observed. No foundation drains were observed.

(c) Appurtenant Structures

The spillway structure was found to be in fair condition. Concrete surfaces are in satisfactory condition, showing only minor normal deterioration. The retaining wall along the right side of the approach channel was found tipped toward the pond about 15°. Silt and debris have collected on the bottom of the approach channel up to the top of the stop log. Steel bridge beams show rust. Drain outlets are in good condition.

Filters and control buildings are in good condition, sound and tight. The auxiliary pump building shows deterioration of concrete walls and roof. The aeration basin was not in use and shows deterioration.

(d) Reservoir Area

The reservoir area appeared to be clear and free from debris.

(e) Downstream Channel

The downstream channel is a stony channel a few feet from the embankment below the dam and in some areas along a dry stone retaining wall or channel training wall. It was found in fair condition.

3.2 Evaluation

The dam is generally in fair condition. Deficiencies are as follows:

1. Some stones facing the upstream edge of the top road have fallen out of place.
2. Trees and shrubs are growing in the dam top embankment.
3. Dam top elevation is not uniform.
4. The spillway approach retaining wall is tipping into the channel.
5. The approach channel has silted up to stop log level.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 Operation Procedures

No written operating procedures for the dam are known. A 2-inch x 10-inch plank has been installed at the spillway to raise pond level and provide more storage for water supply use. The dam operates in a self regulating mode. No warning system is in effect.

4.2 Maintenance Procedures

No written maintenance procedures are known. Occasionally the intake and drain valves are operated to check performance. Other maintenance is undertaken when the need arises.

4.3 Evaluation

Daily operating procedures are not considered necessary since the dam is self regulating. Operating policy regarding stop logs or flash boards should be established and regular check made for compliance. Maintenance inspections and valve tests should be made on an established schedule, at least annually. A downstream emergency flood warning system should be developed.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Long Pond Dam is an old earth embankment dam located on Long Pond Brook about two (2) miles above its confluence with Seekonk Brook which discharges to the Green River, a tributary of the Housatonic River. The watershed above the dam contains about 580 acres (0.90 square miles) bounded on the west and northeast by steep mountains, and on the north and southeast by rolling hills, and a small hill to the south. All except about 35 acres are densely wooded. Runoff on this watershed would be concentrated quickly with no lowlands or swamps to attenuate runoff. There are no significant streams concentrating water into the reservoir.

Downstream of the dam the brook runs through a small dam to Division Street. South of Division Street is a swampy area before the brook runs down to Simon's Rock Early College where a number of small dams have been constructed to provide ponds for landscape purposes.

The Long Pond Dam spillway is a simple overflow crest with no regulation except timber stop logs that may be placed across the opening.

5.2 Design Data

No design data are known to exist.

5.3 Experience Data

Record flood runoff data indicates that 400 cfs inflow to Long Pond Dam may have occurred in August 1955. The present spillway without flashboard would not pass more than about 140 cfs without overtopping the dam. 250 acre feet of storage between top of flashboard and top of dam probably reduced the peak sufficiently to avoid overtopping No reports have indicated that this dam was overtopped at any time.

5.4 Test Flood Analysis

The objective of the test flood analysis is to assess the capacity of the dam to safely pass a severe runoff event of a size commensurate with the size of the dam and the downstream hazard to life and property.

Guidelines for establishing a test flood are specified in "Recommended Guidelines" of the Corps of Engineers. Both the height of this dam (15.4 feet), and the storage volume at the top of the dam, (700 ac. ft.), place this dam in the SMALL size class. The potential for significant damage to two major roads, a private road and private school buildings and few, if any, deaths puts this project in the SIGNIFICANT hazard category. Table 3 of the Corps of Engineers "Recommended Guidelines" indicates that the spillway test flood for a SMALL size, SIGNIFICANT hazard class dam should be 100 year return period (1% probability) to 1/2 PMF.

Storm runoff for a 100 year flood, estimated based on U.S. Geological Survey Open File Report No. 74-131, "Flood Magnitude and Frequency of Massachusetts Streams," is 132 cfs. It is estimated that flows of this magnitude can pass the spillway without overtopping the dam.

A Probable Maximum Flood (PMF) was also estimated based on New England Division, Corps of Engineers "Preliminary Guidelines for Estimating Maximum Probable Flood" by extrapolating the mountainous terrain curve to the drainage area of 0.9 sq. mi. The resultant 1/2 PMF test flood is 1270 cfs. A flood of this magnitude (1,270 cfs), and of 9.5-inch depth total runoff volume was routed through the reservoir by "Preliminary Guidelines" method starting with reservoir at flashboard height. Assuming the flashboard would go out before peak outflow, this routing results in flow over the top of the dam about 0.6 feet deep.

Evidence of runoff peaks in the area indicates that runoff in the August 1955 hurricane storm likely would have exceeded three times the spillway capacity. Available evidence is that the dam survived that storm without damage. This indicates that this dam has probably survived floods of at least the magnitude of the 100 year flood estimated without being overtopped.

5.5 Dam Failure Analysis

The hazards and potential damages resulting from failure of Long Pond Dam were evaluated assuming reservoir level at top of dam (elev. 891.7 MSL) by the procedures suggested in New England Division, Corps of Engineers "Rule of Thumb Guidelines for Estimating Downstream Dam Failure Hydrographs." No allowance was made for possible clogging of waterways caused by trees and debris. The length of the dam at mid height and the height of the dam were taken from the dam and valley profile sketch, attached in Appendix B, as inferred from visual observation at the time of the inspection. Spillway details were also based on measurements made at the time of the inspection as shown on the sketches of the project. The peak discharge using the suggested "Rule of Thumb" is 3,874 cfs. This flow was routed downstream to the confluence of Long Pond Brook with Seekonk Brook and Green River.

The character of this dam of low height in a narrow valley is not likely to result in as large flows if it fails as a dam in a wider valley. The character of the dam embankment which extends about twice as far downstream as might normally be expected for a dam of this height also reduces the liklihood of a sudden catastrophic failure. A third feature of this dam that tends to reduce the risk of catastrophic failure is the presence of a concrete core wall that would help to reduce the rapidity of erosion of the entire embankment in the event the dam is overtopped. There is also reported to be some stonework remaining of a former dam about 800 to 1000 feet further north that would also tend to restrict a sudden outflow from the main area of the reservoir.

Between the dam and Division Street, the brook runs through a small pond that would be overtopped. It was assumed that the storage effect of the pond would be offset by the contribution of the pond

reservoir when it washed out. Division Street would suffer water flow over the embankment about 1.8 feet deep due to dam failure which would cause considerable damage to the road embankment. There are no houses in the area that would be damaged. Depth of water flow over Division Street just prior to dam failure due to spillway outflow (700 cfs) would be about 0.5 feet. This might also cause considerable damage to the road.

Downstream of Division Street is a swamp that would have some effect in storing the dam failure flood before it passed downstream past a house which is apparently 10 to 15 feet above the brook. Little damage is expected through this wooded area and past the house to the area of Simon's Rock Early College.

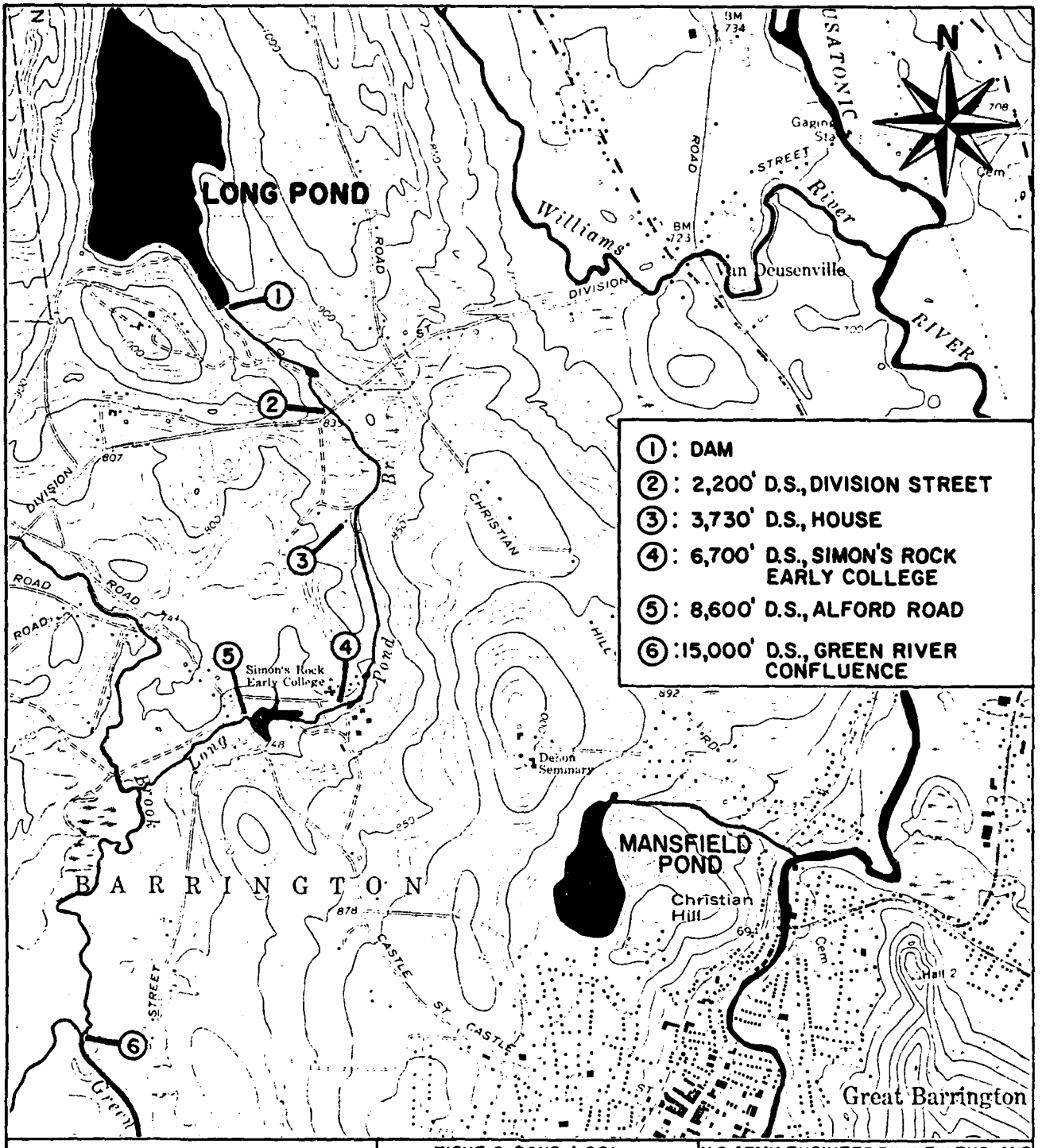
At Simons Rock Early College there are several (4) small dams and roads crossing the stream. These dams or roads would suffer flow over the top of depths of about two (2) to four (4) feet due to dam failure. This would cause considerable damage to the roads and walks. All except one or two classroom buildings are high enough to escape damage. Spillway outflow just prior to dam failure would cause flow over these roads at depths of about one (1) to two (2) feet causing damage to the roads and some classroom buildings.

Alford Road may have water flowing over the embankment about 1.3 feet deep due to dam failure. This would probably cause substantial damage to the road and embankment. The nearby houses are high enough to escape serious damage. No overflow of Alford Road due to spillway outflow prior to dam failure would occur.

Between Alford Road and Hurlburt Street the flow will join Seekonk Brook and Green River. The drainage area here is about 52.5 square miles. Discharge for 1/2 PMF on this size of mountainous drainage area is estimated to be 36,750 cfs. or over fifteen (15) times the dam failure flow. The dam failure flood will not significantly increase damage that would result from a comparable flood without dam failure. This analysis is summarized in the following table.

Downstream Impacts of Dam Failure

Map Location No.	Distance Downstream From Dam Feet	Feature	No. of Dwellings (Buildings)	Before Dam Failure: Flow & Stage cfs-ft.	Before Dam Failure: Depth Over Road Ft.	Before Dam Failure: Bldgs. Damaged	After Dam Failure: Flow & Depth cfs-ft.	After Dam Failure: Depth Over Road Ft.	After Dam Failure: Bldgs. Damaged	Comments
1	0	Dam	0	700 2.4	---	---	3,880 6.4	---	---	---
2	2200	Division St.	3	700 2.3	0.5	0	3,838 6.3	1.8	0	Damage to road.
3	3750	Below swamp	1	700 2.8	---	0	3,654 5.5	---	0	Little damage, house is high.
4	6700	Simon's Rock Early College	8	700 2.8	0.7	2	3,590 5.4	3.7	3	Damage to roads & some classroom buildings.
5	8600	Alford Rd.	3	700 3.0	0	0	3,560 8.0	1.3	0	Damagek to road by failure.
6	15000	Above Hurlburt St.	3	700 3.0	---	0	3,270 7.8	---	0	Little damage above Hurlburt S



- SCALE -

1000' 0 1000' 2000' 3000'

FROM: U.S.G.S. EGREMONT, AND GREAT BARRINGTON, MASS. QUADRANGLE MAPS

QUADRANGLE LOCATION

TIGHE & BOND / SCI
CONSULTING ENGINEERS
EASTHAMPTON, MASS.

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND DOWNSTREAM HAZARD MAP

LONG POND DAM (MA00024)
BERKSHIRE COUNTY

GREAT BARRINGTON
MASSACHUSETTS

SCALE: AS NOTED

DATE: FEBRUARY 1980

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

Visual inspection revealed no sign of significant displacement or failure of the embankment or spillway and no sign of leakage or seepage.

The retaining wall along the right side of the spillway approach channel has tipped toward the channel.

6.2 Design and Construction Data

No design or construction data is available or known.

6.3 Post Construction Changes

It was reported that about five (5) years ago the spillway and bridge were rebuilt. At that time the reservoir was lowered and the remains of an old dam about 800 feet further north were visible.

6.4 Seismic Stability

Long Pond Dam is located in seismic zone No. 2. According to the recommended Corps of Engineers guidelines, a seismic analysis is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

(a) Condition

The dam is generaly in fair condition. The embankment and spillway are stable and there are no signs of leakage or seepage. The retaining wall at the right side of the spillway approach channel is tipping toward the channel.

(b) Adequacy of Information

There is no information on design or construction. The long history of satisfactory performance together with the visual inspection, when combined with sound engineering judgment, permit adequate assessment of the safety of this dam.

(c) Urgency

The recommendations and remedial measures described herein should be implemented within one year of receipt of this Phase I Inspection Report.

7.2 Recommendations

The recommendations of this Phase 1 investigation are that the following additional studies be made under the supervision of a qualified, registered professional engineer.

1. Determine adequate procedures for strengthening or stabilizing the spillway approach retaining wall.

2. Remove all trees and shrubs from the downstream face of the dam embankment and maintain an area of about 15 feet horizontally from the downstream toe clear of trees and root systems.

3. Install shut-off valve(s) on all outlet pipes on the pond side of the dam embankment that will be accessible for operation.

7.3 Remedial Measures

The following remedial and maintenance procedures are recommended:

1. The spillway approach channel should be cleaned of silt and debris.

2. Discontinue the use of stop logs or flashboards.

3. Replace facing stones along the upstream edge of the dam top and maintain the face stones.

4. Fill the dam top to a uniform elevation and maintain it.

5. Develop a program of annual technical inspections supplemented by regular reports of operating conditions and changes.

6. Develop a downstream emergency flood warning system.

7. Clean and paint steel beams supporting access bridge.

8. Develop a regular program of inspecting and operating outlet gate valves to insure their operability.

7.4 Alternatives

There are no meaningful alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Long Pong Dam

DATE 11/14/79

TIME 7:00 A.M. - 11:00 A.M.

WEATHER Overcast, light breeze 3°C

W.S. ELEV. 890 U.S.M.S.L.D.N.S.

Based on U.S.G.S. Topo
Egremont Quadrangle

PARTY: TIGHE & BOND/SCI

1. J.W. Powers, P.E., Project Manager
2. G.H. McDonnell, P.E. Hydrology/Hydraulics
3. E.A. Moe, P.E., Soils/Hydraulics
4. O.H. Dumais, Jr., Civil
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. All features inspected by all members of the party.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Also present:

Harold O'Brien, Housatonic Water Company

INSPECTION CHECK LIST

PROJECT Long Pond Dam — DATE 11/14/79

PROJECT FEATURE Embankment — NAME Tighe & Bond party

DISCIPLINE _____ — NAME _____

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	892.4 ±
Current Pool Elevation	890.0 M.S.L. from U.S.G.S.
Maximum Impoundment to Date	890.25 from water mark. Reported to be max. in 38 years.
Surface Cracks	None
Pavement Condition	Gravel road sound, no sign of trouble
Movement or Settlement of Crest	Top elevation varies 0.6' max. to min.
Lateral Movement	None evident
Vertical Alignment	Top varies ± 0.3'
Horizontal Alignment	Satisfactory
Condition at Abutment and at Concrete Structures	Good Concrete core wall reported to end at spillway structure near right abutment
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None
Vegitation on Slopes	Good grass sod and small trees
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	Dry rock face 3' high has crumbled back up to 10" in a few places. Otherwise satisfactory
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	None. Filter facilities cover toe and extend slope 60'±
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECK LIST

PROJECT Long Pond Dam — DATE 11/14/79

PROJECT FEATURE Water Works Intakes, Pond Drain — NAME Tighe & Bond party

DISCIPLINE — NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Reported: "New intake is 10" C.I. pipe 20'± into pond and 4' - 6' deep.
Slope Conditions	Old Intake is 14" C.I. pipe 700± ft. north along east shore & 40'-20' out from shore about 8'-10' deep.
Bottom Conditions	
Rock Slides or Falls	
Log Boom	Valve under water near each intake. Both intake pipes join & are shut off on downstream side of dam & core wall by one valve."
Debris	
Condition of Concrete Lining	At least one & probably 2 intake pipes pass through dam & core wall.
Drains or Weep Holes	One control valve 18' downstream of dam & core wall. No accessible pondside control valve.
b. Intake Structure	Old Dam 700' north (upstream) is said to have been removed & inundated with the "new" dam 40± years ago.
Condition of Concrete	
Stop Logs and Slots	
Pond drain	8" C.I. pipe outlets in brook channel = spillway discharge channel 60' downstream and 14.9' below top of dam. 8" drain pipe ends in conc. headwall in discharge channel. Headwall & pipe in good condition. Valve is 18' downstream of dam & core. No pond side valve.

INSPECTION CHECK LIST

PROJECT Long Pond Dam DATE 11/14/79

PROJECT FEATURE Water Works Filter Control Blg. NAME Tighe & Bond party

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	Filter control building for water supply
a. Concrete and Structural	Good. 14.5' x 18.5' outside Marked "1932"
General Condition	Good structurally
Condition of Joints	None
Spalling	None
Visible Reinforcing	None
Rusting or Staining of Concrete	None
Any Seepage or Efflorescence	None
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	None
Cracks	None
Rusting or Corrosion of Steel	None
b. Mechanical and Electrical	Auxiliary gas driven backwash pump building 11.5' x 10.25' concrete marked "1942"
Air Vents	
Float Wells	____
Crane Hoist	Yes
Elevator	None
Hydraulic System	None
Service Gates	Water Works gate valves
Emergency Gates	Water Works gate valve downstream of dam & core wall
Lightning Protection System	None
Emergency Power System	None
Wiring and Lighting System in Gate Chamber	120V

Operating pipe gallery floor is 11.3 + 2.9 + 2.33' below top of dam. Sump 3' x 3' x 2.33' deep. 8" C.I. drain to discharge channel 80' from dam. Outlet has flapper to keep out small animals

INSPECTION CHECK LIST

PROJECT Long Pond Dam DATE 11/14/79

PROJECT FEATURE Spillway NAME Tighe & Bond party

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Spillway & spillway bridge rebuilt about 5 years ago
a. Approach Channel	
General Condition	Fair
Loose Rock Overhanging Channel	Retaining wall tilts in $15^{\circ}\pm$
Trees Overhanging Channel	Some
Floor of Approach Channel	Silt & debris against stop log plank
b. Weir and Training Walls	Weir crest length = 9.6' freeboard to top of dam = $2.2'\pm$
General Condition of Concrete	Fair. no spawls, minor deterioration of surface
Rust or Staining	None
Spalling	None
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None
Drain Holes	None
Stop Log	2"x10" plank on concrete crest. Overflow o'-3/4" deep.
c. Discharge Channel	
General Condition	Fair rough and stony
Loose Rock Overhanging Channel	Rock brook bottom & sides only
Trees Overhanging Channel	Yes
Floor of Channel	Loose rock
Other Obstructions	None
Bridge over spillway	Bottom of girder 2.4' above water surface today. Concrete abutments Concrete deck on steel girders 1.8' deep with 8" high conc. curb

INSPECTION CHECK LIST

PROJECT Long Pond Dam — DATE 11/14/79

PROJECT FEATURE Spillway Bridge — NAME Tighe & Bond party

DISCIPLINE _____ — NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	The bridge is reported to have been reconstructed abour five years ago.
a. Super Structure	
Bearings	9' - 7" span 14'-6" wide over all
Anchor Bolts	None
Bridge Seat	Good
Longitudinal Members	Fair, needs protective paint
Under Side of Deck	Good condition
Secondary Bracing	None
Deck	Good
Drainage System	Good
Railings	None
Expansion Joints	None
Paint	Steel beams need paint
b. Abutment & Piers	
General Condition of Concrete	Good
Alignment of Abutment	Good
Approach to Bridge	Abrupt turn off road
Condition of Seat & Backwall	Good

APPENDIX B

ENGINEERING AND CONSTRUCTION DATA

APPENDIX B

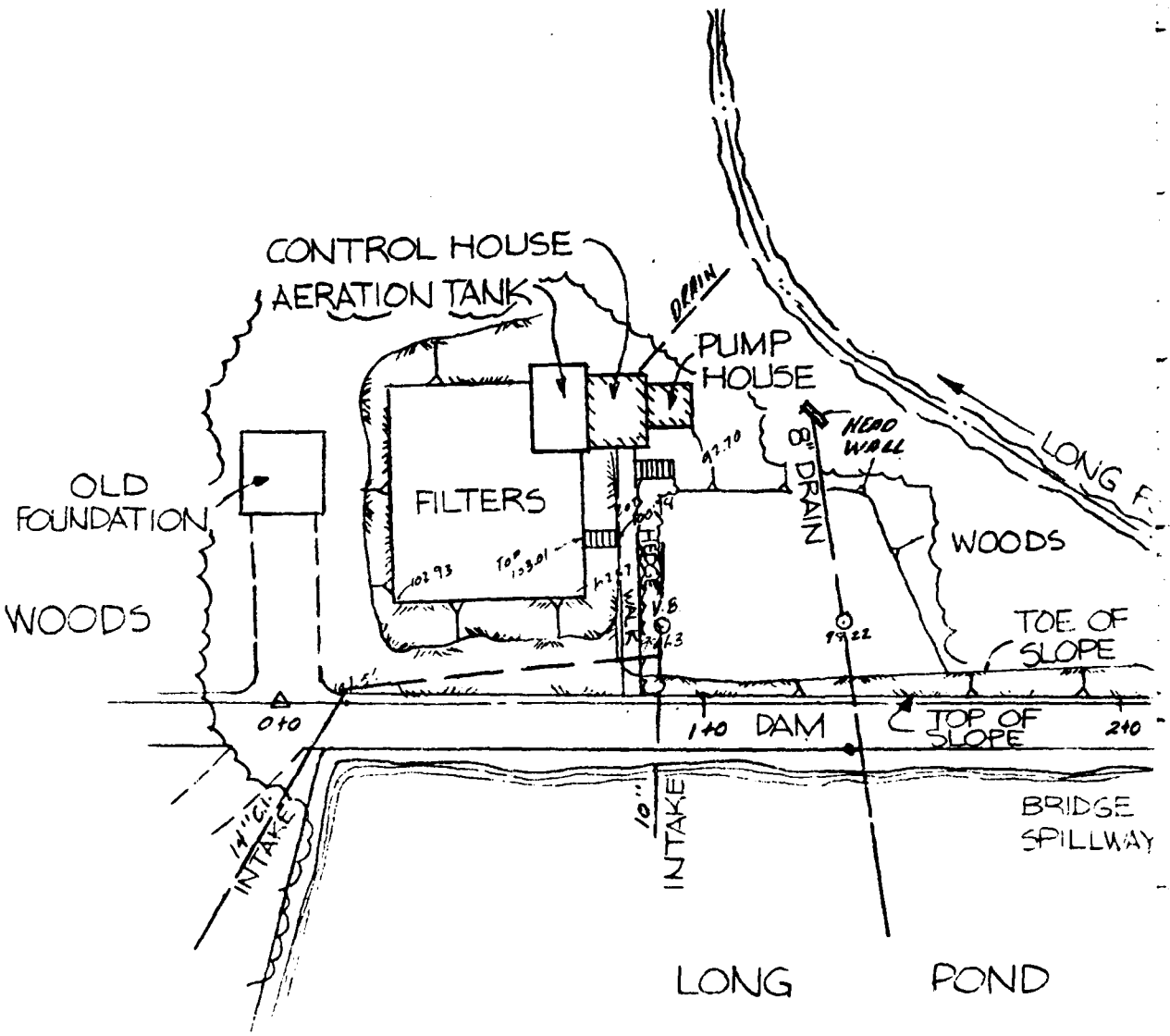
Engineering Design and Construction Records

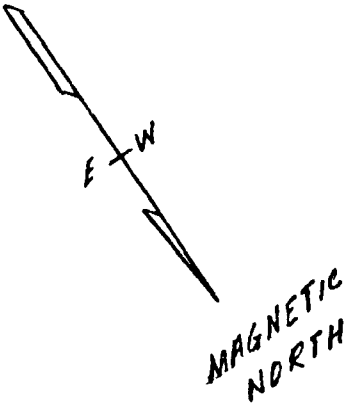
No records of design or construction are available or known to exist.

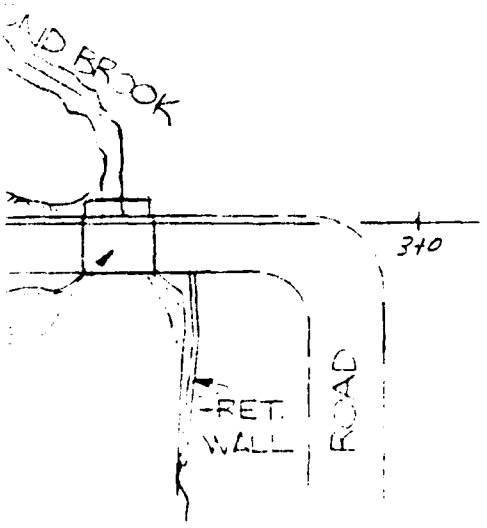
Sketch plans of the dam are attached as follows:

Dam Plan
Dam Profile & Cross Section

No boring logs or information are known to exist.


CONTROL HOUSE
AERATION TANK
DRAIN
PUMP HOUSE
HEAD WALL
LONG F
OLD FOUNDATION
FILTERS
8" DRAIN
WOODS
WOODS
TOE OF SLOPE
040
140 DAM
TOP OF SLOPE
240
14" C.I. INTAKE
10" INTAKE
BRIDGE SPILLWAY
LONG POND

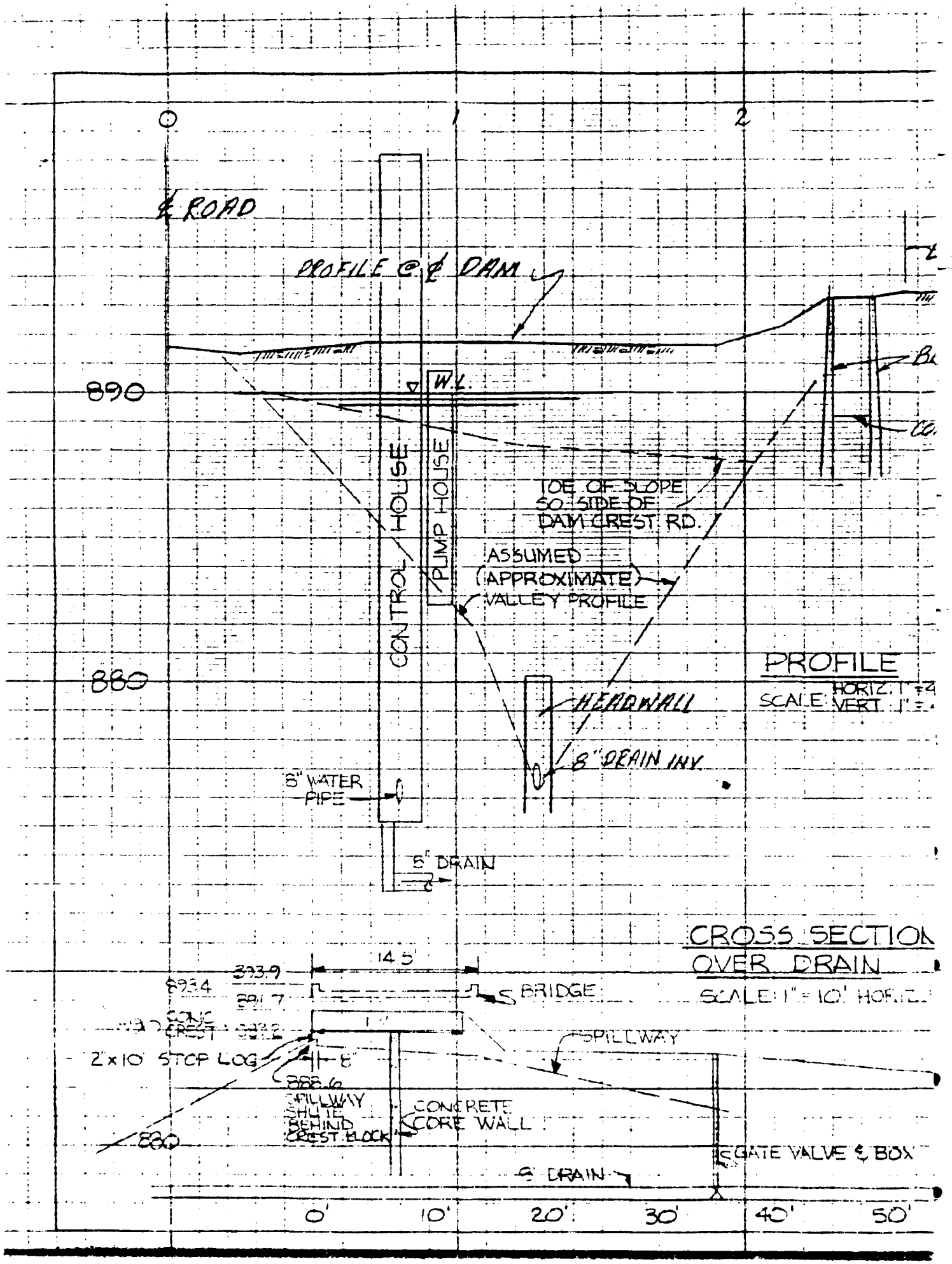


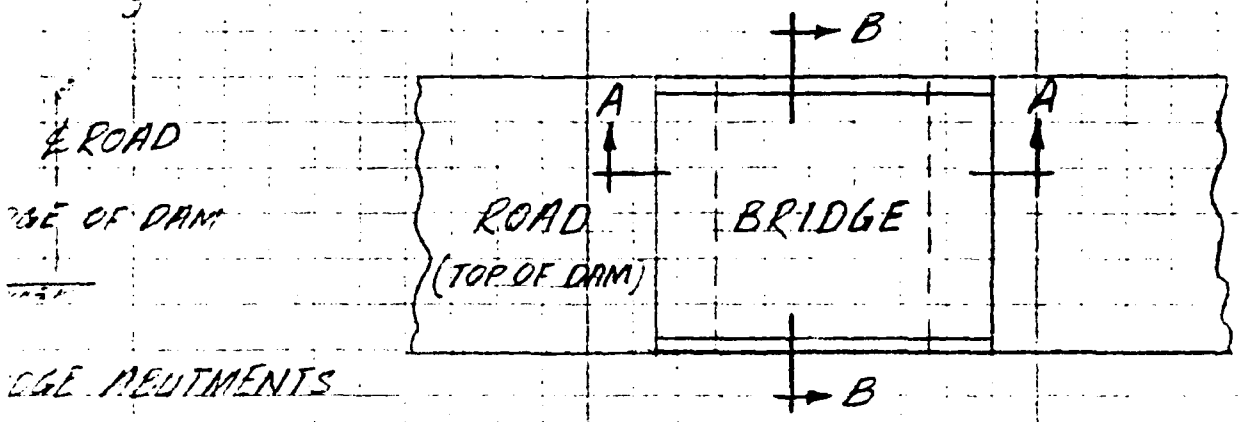


SKETCH PLAN OF
LONG POND DAM
GREAT BARRINGTON, MASS.

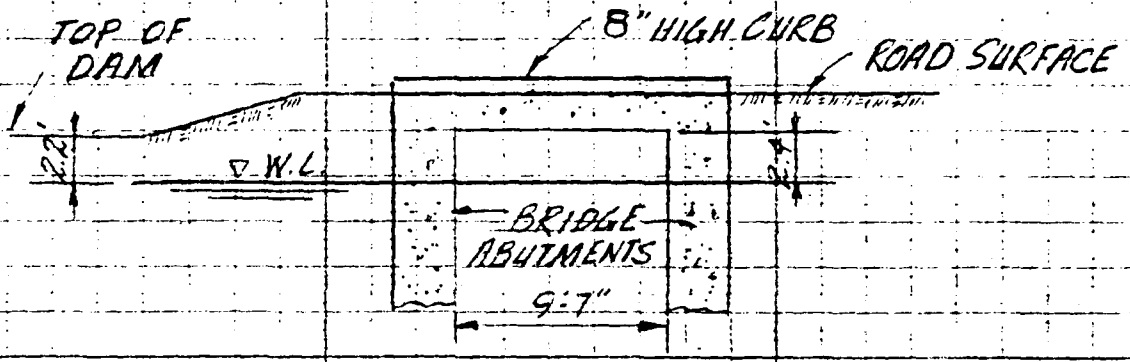
TIGHE & BOND/SCI CONS ENGRS.
EASTHAMPTON, MASS

SCALE: 1"=40' DATE: NOV, 1979

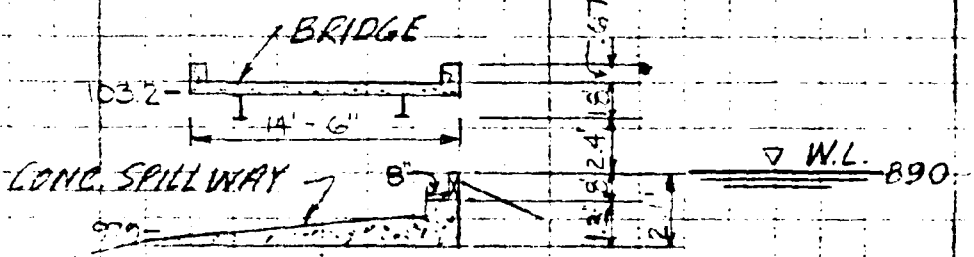

0
1
2
℄ ROAD
PROFILE @ ℄ DAM
890
W.L.
CONTROL HOUSE
PUMP HOUSE
TOE OF SLOPE SO. SIDE OF DAM CREST RD.
ASSUMED (APPROXIMATE) VALLEY PROFILE
880
HEADWALL
8" DRAIN INV.
8" WATER PIPE
5" DRAIN
PROFILE
SCALE: HORIZ. 1" = 4
VERT. 1" =
CROSS SECTION OVER DRAIN
SCALE: 1" = 10' HORIZ.
393.9
893.4
891.7
14.5'
BRIDGE
CONC. CREST
2'x10' STOP LOG
8'
888.6
SPILLWAY SHUTE BEHIND CREST BLOCK
CONCRETE CORE WALL
SPILLWAY
GATE VALVE & BOX
6" DRAIN
880
0'
10'
20'
30'
40'
50'



PLAN

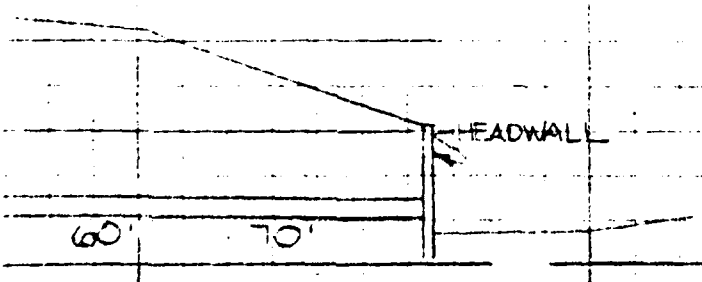


SECTION A-A



SECTION B-B

SCALE 1/8"=1'-0"

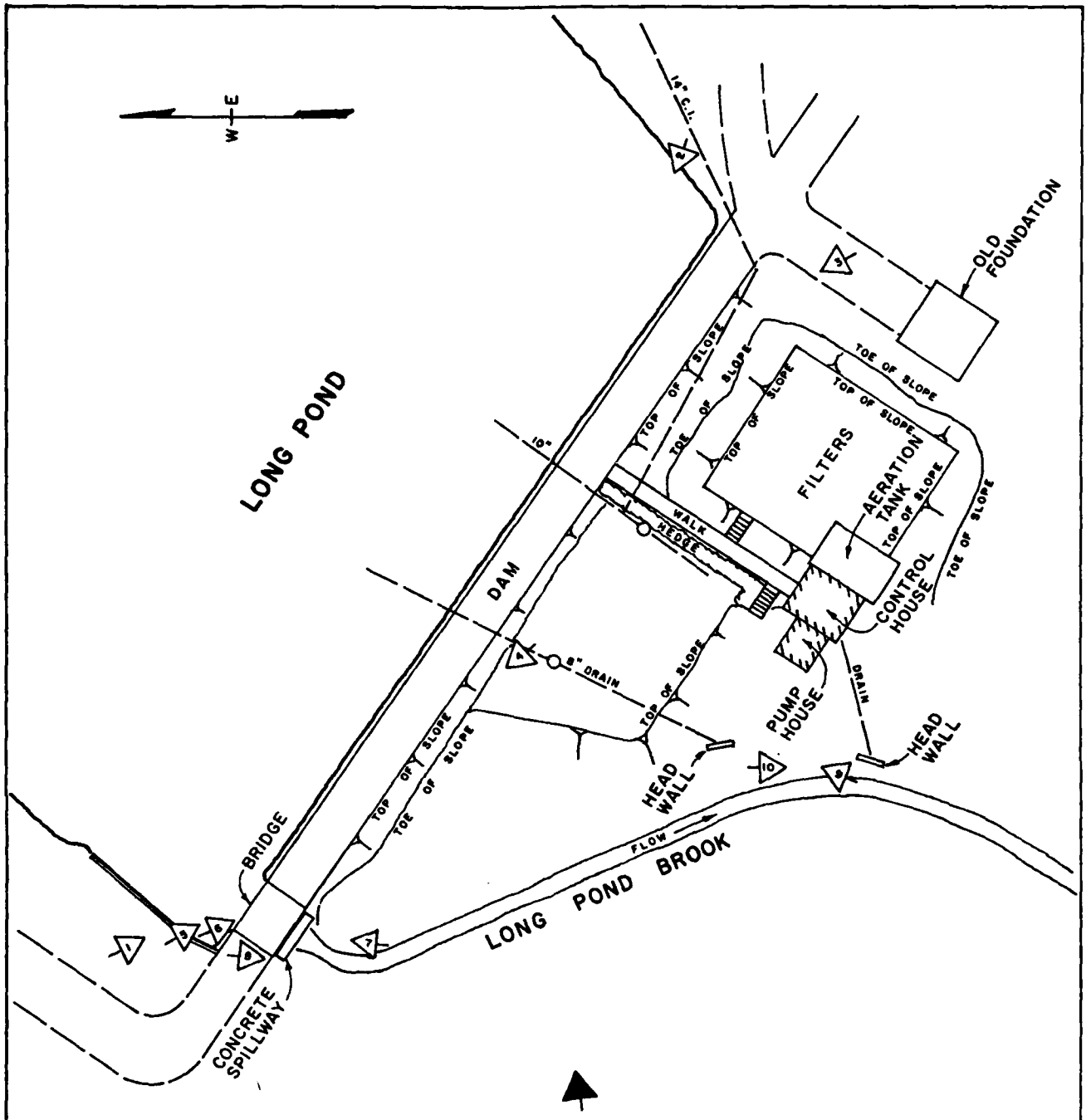


SKETCH
CROSS SECTION & PROFILE
LONG POND DAM
GREAT BARRINGTON, MASS.

FIGHE & BONDISCI CONS. ENGRS.
EASTHAMPTON, MASS.
SCALE: AS NOTED DATE: NOV. 1979

APPENDIX C

PHOTOGRAPHS



OVERVIEW (AERIAL)

APPENDIX C

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION AND ORIENTATION OF PHOTOS

LONG POND DAM (MA 00024)
BERKSHIRE COUNTY

GREAT BARRINGTON
MASSACHUSETTS

			SCALE: NONE
			DATE: FEBRUARY 1980

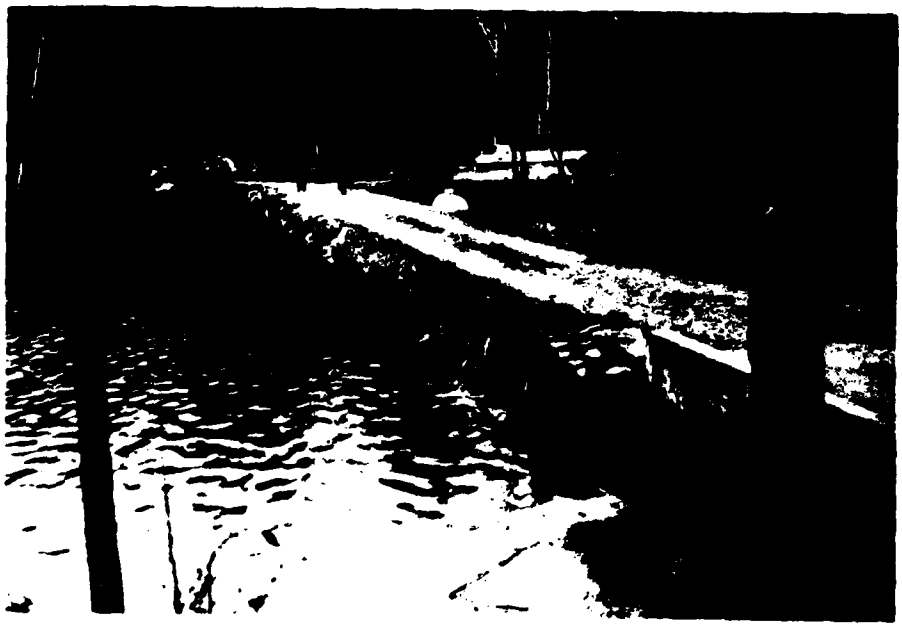


Photo 1

Looking southwest at upstream face of dam.

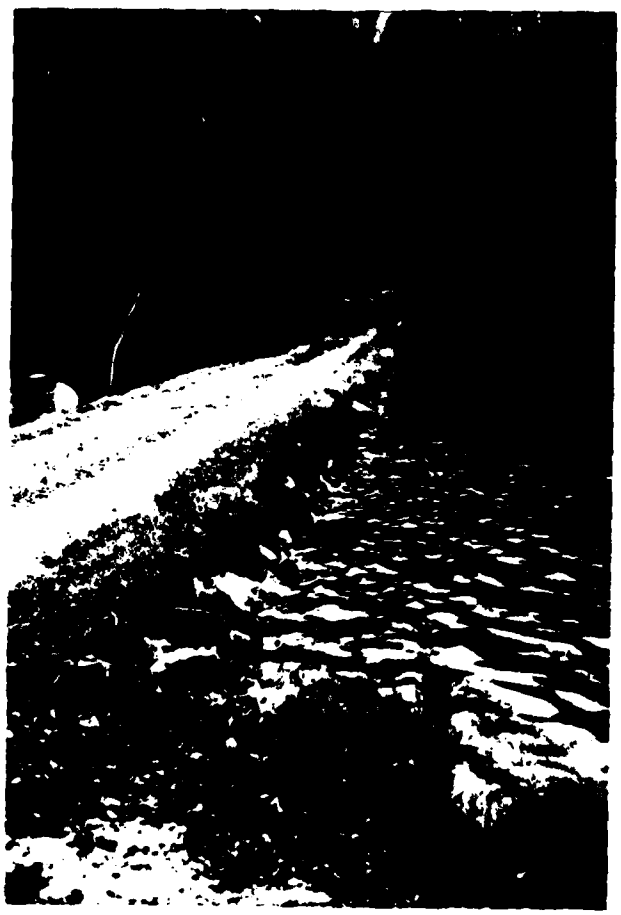


Photo 2

Looking east at upstream face of dam.

Photo 3

Looking northwest at downstream face of dam.

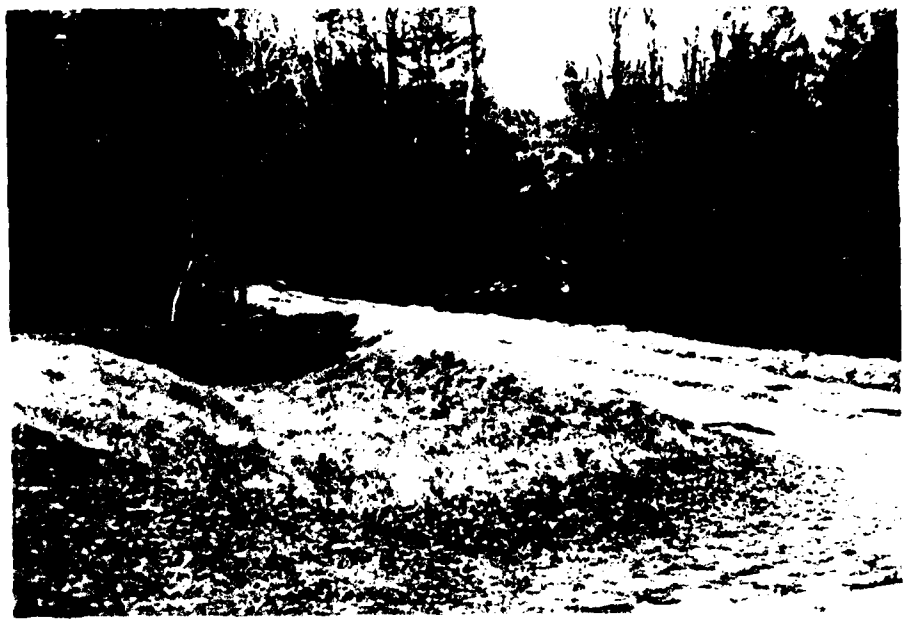
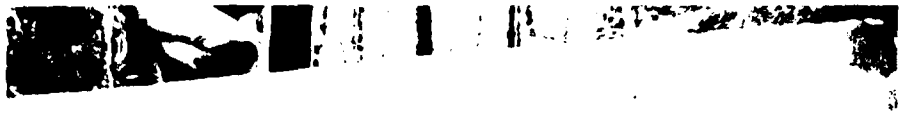


Photo 4

Looking northwest at tree growth on downstream face of dam.

Photo 5

Looking southeast at spillway and bridge.



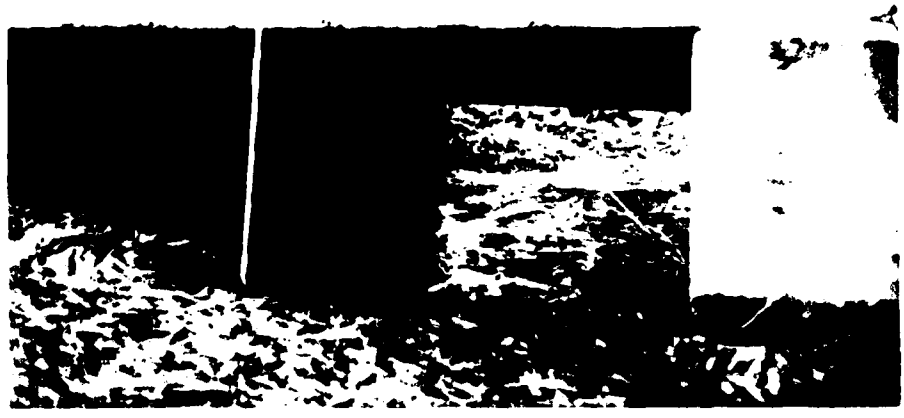


Photo 6

Detail of spillway and bridge inlet.

Photo 7

Looking northwest at spillway outflow channel and bridge.

Photo 8

Looking southeast at spillway outflow channel.

Photo 9

Looking north at spillway outflow channel toward pond drain outlet.

Photo 10

Looking south at spillway outflow channel and control house drain outlet.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

INDEX

Dam Size:
Height:

Dam crest = 891.7
Drain invert = 876.3
Dam Height = 15.4

Height = 15.4' < 40' ∴ SMALL Size

Storage: $\frac{15}{2} \times$ [illegible] × 1130 = 7,017.25 ft³ = 603 Ac-ft

(109.3 - 8.0 15/16 = 506.3
storage at elev. 890 = 566.7 Ac-ft

Area to elev. 900:
Area = (AC) ([illegible]) = 3.31 AC
300) [illegible] = 4.13
180) 1700 = 7.02
(100) (11140 - 5900) = 12.03
Area at elev. 900 = 26.49 Ac + 109.3 = 135.8 Ac.
Volume = (109.3 + 26.5)10 = 1225.5 AF 1792.2 AF
Volume 890 to 891.8 = $\left(109.3 + \frac{26.5(0.13)}{2}\right)1.8$ = 201.0 767.7 AF

Total storage volume at elev. 891.8 (dam top) = 767.7 AF

Storage = 1810 Ac. Ft. ∴ SMALL Size.
Size Class: SMALL

Down Stream Hazard:

[illegible] of [illegible] St. / house 12 - 15' [illegible]
Unlikely loss of life
[illegible] Rte Camp College Residential 15'-6' above bridge
Admin. Bldg 10' - 15' above bridge
Storage Bldgs 0 - 10' above bridge
Loss of life unlikely but a few possible

SR [illegible] R.R. / house 6' - 15' [illegible]
Unlikely loss of life

[illegible] only a few lines

Damage to road at Simonds Rd. is [illegible]
[illegible] possible 2 houses

Hazard Class: Sup SIGNIFICANT

Spillway Test Flood 0.5 - 1.0 lines Twin =
100 year → 1/2 PMF

Spillway Test Flood 2/5 | LONG POND DAM MA

Test Flood: ½ PMF ⇒ 100 yr flood

Drainage area = 579 Acres = 0.90 sq. mi
Extrapolate MPF curve to 0.9 sq. mi

Terrain: Ave. Slope: west side = 540 / 1320' = 1320 min ridge 540
east side = 240 / 2200' = 2200 min ridge 372
Ave. slope = 21% 912

Min. slope: 65/2100 = 3.1% = 163 ft/mi.

Use Mountainous terrain curve.
q_p = 2830 cfs/sq. mi.

PMF = 2830 (0.90) = 2547 cfs ⇒ 2550 cfs.
½ PMF = 1270 cfs

Spillway: crest length = 9.7'
crest elev. top of flash board = 890.0
crest elev. top of conc. = 889.2
Top of dam embankment = 891.7
Top of spillway opening = 892.7
Top of spillway bridge deck = 893.2
Crest form: gravel approach ; C = 3.6
$Q = CL(H+h_v)^{3/2}$ pg 169 (King, Handbook, Woodburn, 1949)

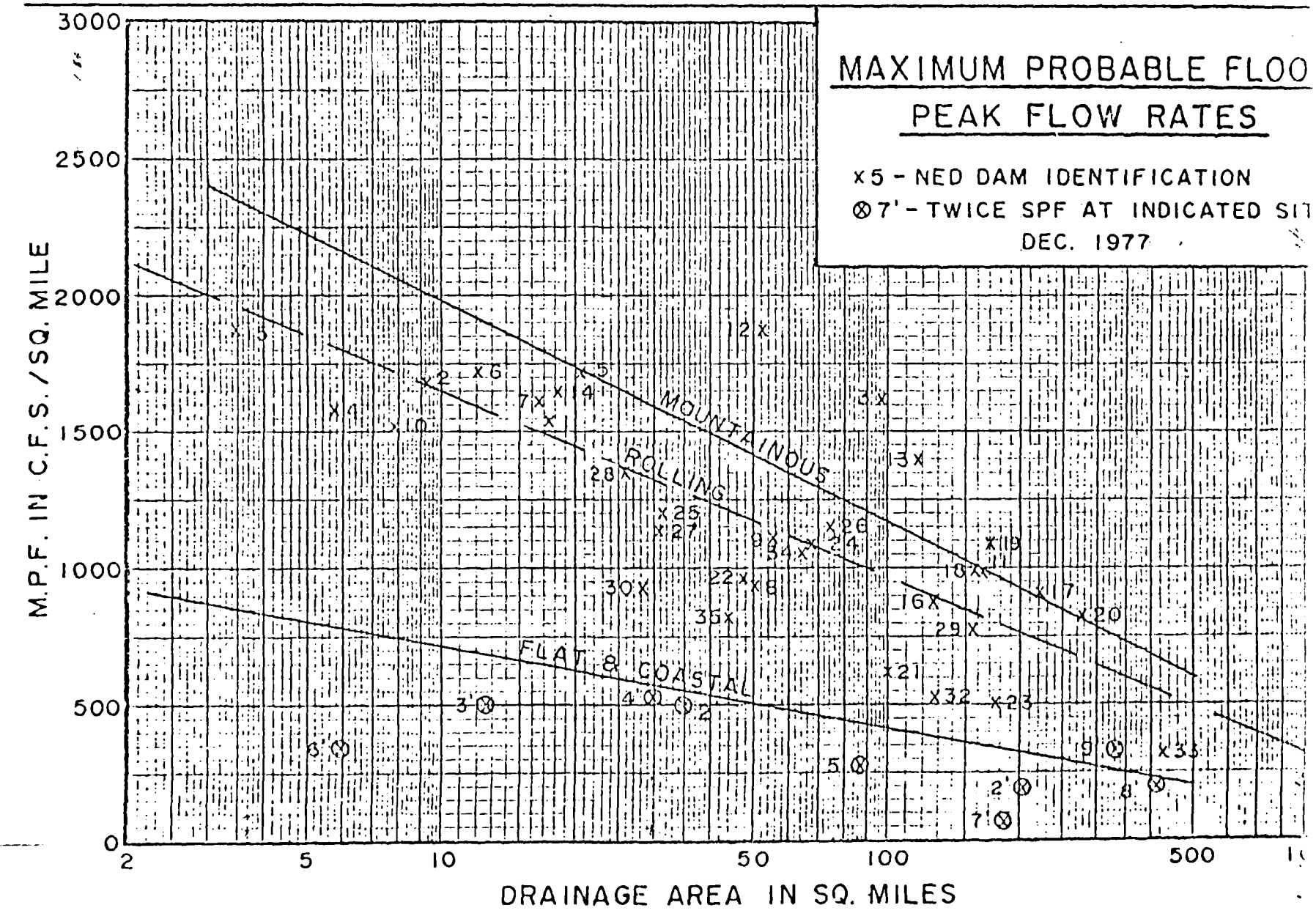
Overflow capacity

Elev.	H	Q	Embankment L=200' $Q=3.1LH^{3/2}$	Spillway w/ Flashboard $Q=3.6(3.6)H^{3/2}$	NO Flashboard $Q=3.6(3.6)H^{3/2}$	Over Bridge $Q=3.0(30)H^{3/2}$		NO Flashboard Total cfs.
			orifice $Q=.96(3.4)\sqrt{2g}H^{1.2}$		$Q=.96(3.2)\sqrt{2g}H^{1.6}$			
889.2			0		0			0
890.0			0	0	0.8	25		25
891.7	0		1.7	77	2.5	137		137
892.4	0.7	362	2.4	185	3.2	312	0	875
893.2	1.5	1139	3.2	261	4.1	382	0.5	64	1586
895.0	3.2	3549	5.0	360	5.8	505	2.6	377	4421
892.6	0.9	524	2.6	211	3.41	331	0.2	8	865
890.2			0.3					

Q = 3.32 $\sqrt{2gH}$ = 1.25 $\sqrt{H}$; Use h_v = 2.0' ; L = 377.5'

891.05	0.5	88
892.5	1.9	2.1
893.4	1.8	4.7

Critical Depth: $H = \frac{V^2}{2g}(1.72 + \frac{L}{5V^2}) = 5.0\frac{V^2}{2g}$

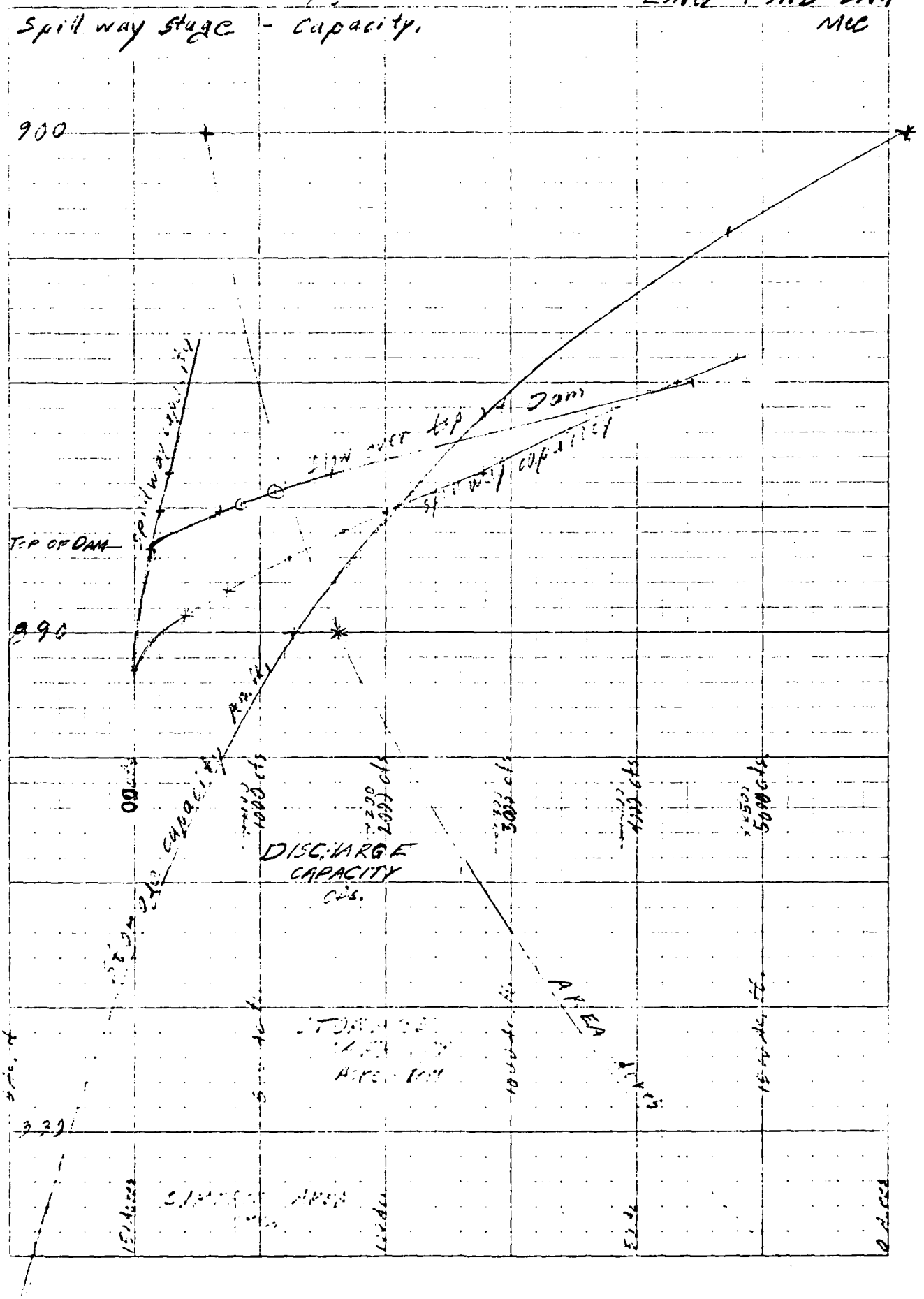

MAXIMUM PROBABLE FLOO
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SI
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
DRAINAGE AREA IN SQ. MILES
MOUNTAINOUS
ROLLING
FLAT & COASTAL

4/5

LONG POND DAM

MCC

Spill way stage - capacity.



Spillway capacity at top of Dam = 137 cfs.

PMF Q_{p1} = 2550 cfs

Spillway capacity is not adequate for PMF

Spillway capacity is not adequate for ½ PMF

Route ½ PMF for small dam: ½ PMF = 1270 cfs

Elev. = 892.8 From page 4

Runoff volume = 19½ = 9.5" = ½ PMF

Convert 9.5" to acre ft.: $\frac{9.5}{12}(579) = 459$ Ac. ft

$STOR_1 = 800 - 566.7 = 233$ Ac. ft.

$Q_{p2} = Q_{p1}\left(1 - \frac{STOR_1}{459}\right) = 1270\left(1 - \frac{233}{459}\right) = 625$ cfs.

Elev. = 892.3

$STOR_2 = 750 - 567 = 183$ Ac. ft. Ave. = 208 Ac. ft.

$Q_{p2} = 1270\left(1 - \frac{208}{459}\right) = 695$ cfs.

Elev. = 892.4 ≅ 892.3

Top of dam = 891.7

DAM OVERTOPPED BY 0.6 ft. No flashboard

Check: Peak runoff from 100yr. flood

$Q_{100} = 0.26\,A^{0.94}\,S^{0.137}\,P^{4.83}$

A = 0.90 sq. mi. P = 44"/yr. = 3.67'/yr.

S = $\frac{1000 - 910}{5310 - 1010} = \frac{90}{4300} = 2.1\%$ Length = 5310'

$Q_{100} = 0.26(0.90)^{0.94}\,285^{0.137}\,3.67^{4.83} = 138.5$ cfs.

Capacity of spillway without overtopping of the dam = 137 cfs

The dam and spillway is inadequate by this criteria.

Major paper by Dr. Floyd Magnitude and Frequency of Floods in Indiana, by Carl G. Johnson and Gary D. Taylor, Mar. 1976, USGS Open File Report 76-15

Mid height = (391.3 + 376.3)/2 = 383.8

Length = 90' W_b = width = 36'

Head Y_o = 392.3 − 376.3 = 16.0'

$Q_{pl} = \frac{2}{3} W_b \sqrt{2g}\, Y_o^{3/2} = 1.63(36)\,16.^{3/2} =$ 397.1 c.f.s

Dam at station 16+00 Sta 16+00

Pool surface 400' x 120'

Dam height = 3.3' above normal W.L.

Spillway 5' wide x 1' deep [illegible] width weir.

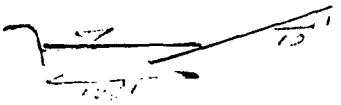
Capacity = $Q = A\sqrt{\frac{2gH}{1.5}} = 5(1)_2\sqrt{\frac{2(32.2)3.}{1.5}} =$ 29 c.f.s.

Dam acts as a broad crested weir. Length = 400'

$H_1 = \left(\frac{Q}{2.6(3.1)}\right)^{2/3} = \left(\frac{3874 - 29}{40}\right)^{2/3} =$ 2.1'

Area at normal water level = 400 x 120/43560 = 1.1 Ac.

water at 2' above dam = 5' above normal W.L.



2:1

A_2 = [illegible] = 2.0 Ac.

$V = [(2.0 + 1.1)/2]\ 5/43560 =$ 2.9 Ac Ft.

channel (reduce for steep, narrow gullys) 2' 5'

$A = 2Y + 3Y^2$ S = [illegible] = .33

$P = 5.1Y\ 2 + 2$

$R = A/P = \frac{3Y^2 + 2Y}{(5.1Y\ 2 + 2)}$

n = 0.04

Y = 6'

P = 181.6' [illegible] = 4.0

Q = [illegible]

[illegible] 60.8 [illegible] = 2.04

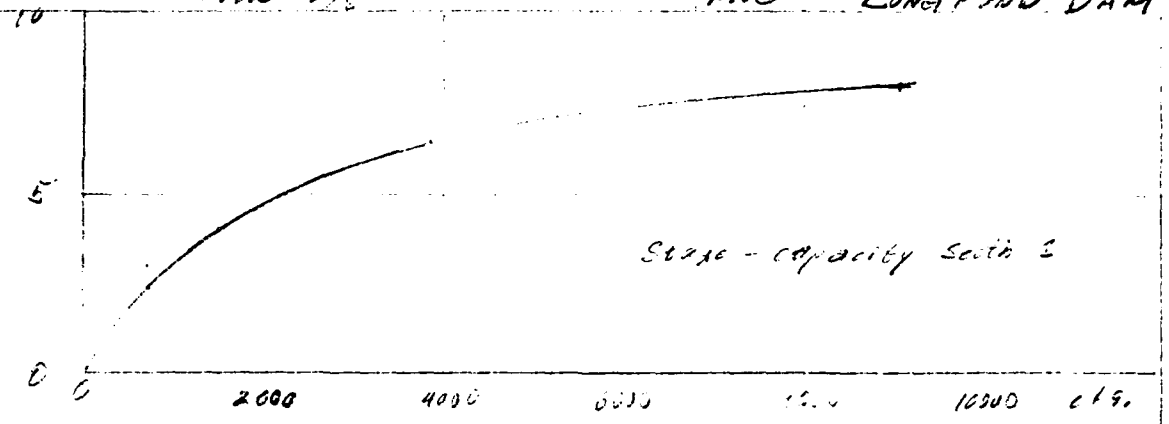
Q = [illegible] 1490 c.f.s.

Q = [illegible] Y_1 = 6.4 [illegible]

V_1 = [illegible] = 9.1 [illegible]

S = [illegible] = 120 Ac. Ft.

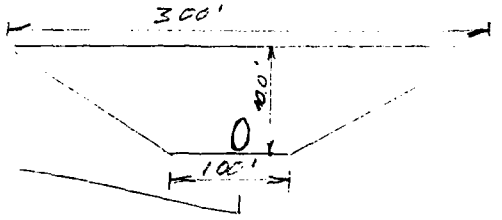
DAM FAILURE FLOOD 2/6 — DHL — MDC — LONG POND DAM



The small pond will contribute to flood crest by failure when overtopped as much as it attenuates by storage. Therefore ignore it.

~~$Q_{p2} = Q_{p1}(1 - \frac{V_1}{S_1}) = 3914(1 - \frac{6.0}{10.5}) = 3541$~~ $Y_2 = 6.4' = 6.4'$

Division street embankment.
Sta 22+00



Projecting 24" Ø Reinforced square end
35' long

Culvert capacity

Head = Height of pond above ℄ 24" = 9.0
+ low road over road + 2.0
Flow depth downstream of road − 5.0
6.0'

$H = \frac{V_2^2}{2g}(\frac{n^2 L}{R^{4/3}} + \text{Entrance} + 1) = \frac{V_2^2}{2g}(1.2 \frac{n^2}{R^{4/3}} + 0.5 + 1) = \frac{V_2^2}{2g}(2.4)$

$Q = AV = \pi r^2 \sqrt{H 2g / 2.4} = \pi 1^2 \sqrt{3(2)(32.2)/2.4} = 46$ cfs.

Head above top of road over road = $(\frac{Q}{3.3L})^{2/3} = (\frac{3541 - 51}{(4)(100)})^{2/3} = 2.81'$

Elev. top of road = 300

Area of pond = $(\frac{(100 + 211 + 211 + 236)}{2})(9 + 0.6) = 2349$ ac

Volume = $(2349 + 3401)\frac{6.20}{43560} = 22$ Ac ft.

$Q_{p2} = 3341(1 - \frac{3.8}{10.5})$ $\underline{3726}$ cfs.

Depth of water over road = 3(Max over road) = $\frac{2}{3}(2.8) = 1.9'$

Velocity = $\frac{(Q_{p2})}{(L)(2.5)} = \frac{(3726)}{(100)(2.5)} = 7.5$ fps.

DAM FAILURE 2 of 2 — Misc LONG POND DAM

Division St. sta 2+40

Channel: Before dam failure: Q = ½ MDF Dis. = 700 cfs

$y = 2.3'$ $A = 47$ □

After dam failure: Q_{DF} = 3,850 cfs

$y = 6.4'$ $A = 340$

$V_1 = (340 - 47)$ 10 yards = 6.0 mi. W.

$Q_{p2} = 3850(1 - \frac{6.0}{700}) = \underline{3050}$ cfs $y = 6.4'$ (no change)

Embankment: Before dam failure: Q = 700 cfs.

$H_2 = (\frac{700 - 46}{\quad})^{2/3} = 0.81$ depth = 3.54'
velocity = 4.2 fps

After dam failure:

$H_A = (\frac{3050 - 46}{\quad})^{2/3} = 2.32$ depth = 1.3'
velocity = 7.5 fps

$V_1 = 300 + 5(100)$ (10 yards) = 3.0 mi. W.

$Q_{p2} = 3850(1 - \frac{3}{300}) = \underline{3834}$ cfs $H = 2.61$ no change.

South of Division St. sheet 3/8

Channel flow before failure: MDF discharge = 700 cfs.

$y = 2.64'$; $A = 84$ □

Channel flow after failure: 3834 cfs

$y = 5.55$; $A = 299$ □

At (3) Below [illegible] (27+30)

$V = 44(2.7) + 299 - 84) 500/43560 = 40.3$ mi. W.

$Q_{p3} = 700 + 3134(1 - \frac{40.3}{700}) = 700 + 2954$ $\underline{3654}$ cfs $y = 5.5$ no change

At (44.67+00)

$V = 299 - 84) \frac{?}{?}$ mi. = 14.3 mi. W.

$Q = 700 + 2954(1 - \frac{14.3}{700}) = 700 + 2892 = \underline{3592}$ cfs. $y = 5.4$ no change

Sunset ... 2000 ...
... 12. ...
2000
2000

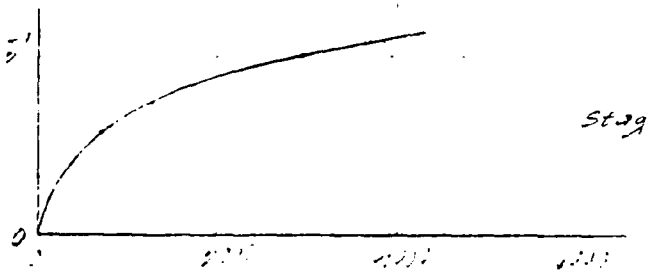
Channel ... Simons R.C. ... Eq. 6.74.
n = .035
S = ...
A: ... 93 ...
P: ... 58.35 ...
R = ...

Y = 5', A = 245 ..., P = 74.55' R = 2.6'

Q = $\frac{1.5}{.035}$ 245 $2.6^{2/3}$ $.02^{1/2}$ = 2938 c.f.s.

Y = 2', A = 93 ..., P = 58.35' R = 1.6'

Q = $\frac{1.5}{.035}$ (93) $1.6^{2/3}$ $.02^{1/2}$ = 907 c.f.s.



Sp. ... 3.46 Area Channel 220 ...

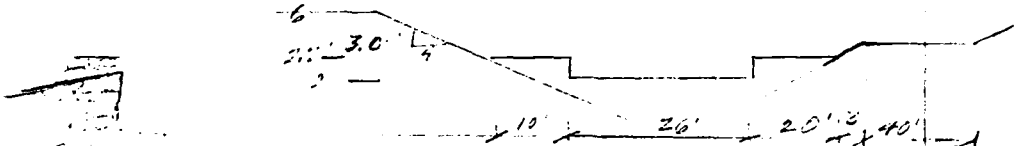
Volume ... = 2.5 (...) = 16.8 ...
Sample: 13.3 (3.45) = 47.3
64.9 ...

Vpa = 2000 (1 - ...) = 3341 c.f.s. Y = 5.2' A = 234 ...

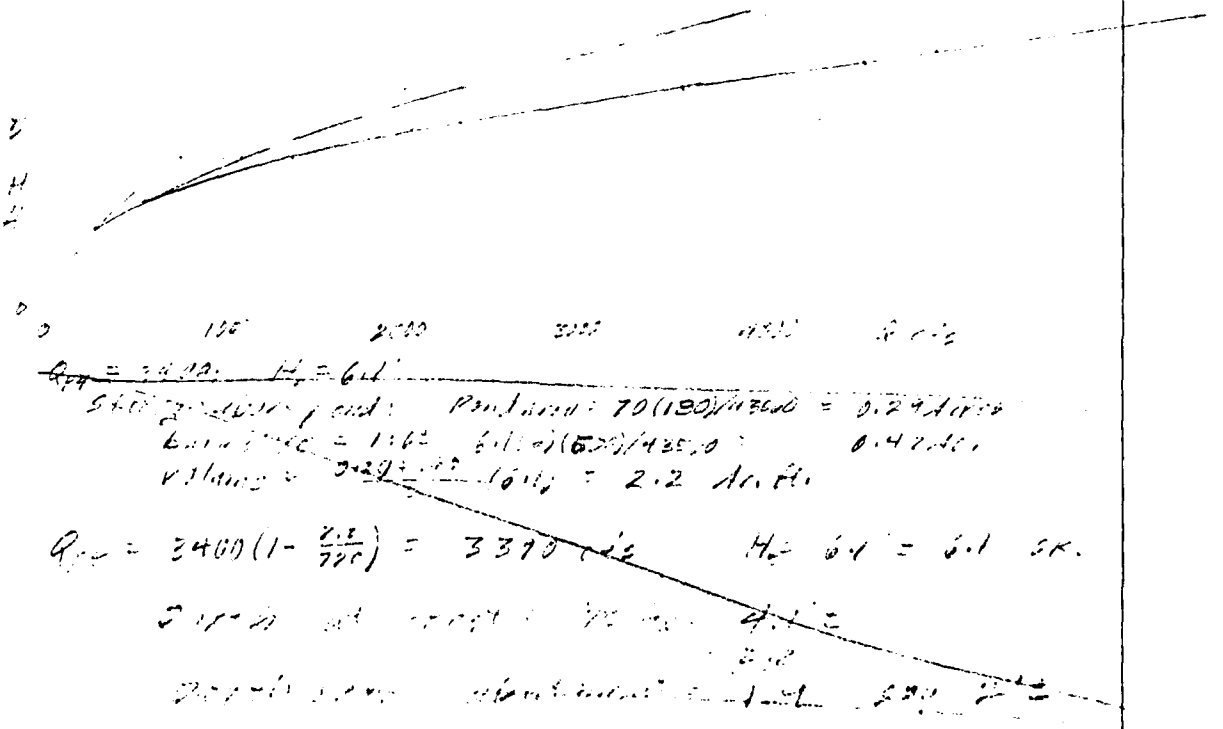
... Area ... = 2.33 ... 15.3 ...
Sample: ... = 46.5
61.8 ...

... 3341 ... = 2020 c.f.s.

OLD STONE DAM AT SIMON'S ROCK EARLY COLLEGE STA 6610



H	Q_S	H	Q_A	H	Hillside Q	Q_T
2.2	256	0	0	0	0	256
3.2	459	0.6	85	0	0	544
4.2	760	2.0	337	1.0	200	1297
6.2	1365	4.0	954	2.2	1241	3560
8.2	2076	6.0	1744	5.2	2573	6393



Q_{PF} = 2400 H_w = 6.4'

Stone Masonry Dam: Permission = 70(190)/43560 = 0.294 Ac-Ft

Earth Dike = 1.6 (6.4)(500)/43560 = 0.472 Ac. Ft.

Volume = 0.294 + 0.472 (0.1) = 2.2 Ac. Ft.

Q_{PF} = 2400 $(1 - \frac{2.2}{720})$ = 3390 cfs H_w = 6.4 = 6.1 SK.

DAM FAILURE W.S.E. W/S. LONG POND DAM

At time dam was Simsbury R.E.C. Sta. 66+00

Before dam failure: Q= 700 cfs; H= 3.25' W dam

After dam failure: Q= 3592 cfs; H= 5.75'
Time [illegible] max W.S. at dam

1st Road in Simsbury R.E.C. Sta. 67+50
Flow over R.R.: $H = \left(\frac{Q \cdot W}{3.33(L)}\right)^{2/3}$

Before dam failure: Q= 700 cfs; H= 1.1' depth= 0.7'; Vel.= 4.9 fps

After dam failure: Q= 3592 cfs; H= 5.6' depth= 3.7'; Vel.= 11.0 fps

2nd Road in Simsbury R.E.C.

Before dam failure: Q= 700 cfs; H_s = 2.5'
Depth over walk = 1/2 (2.5-1.7) = .53'

After dam failure: Q= 3592 cfs; H_s = 4.8'
Depth over walk = 1/2 (4.8-1.7) = 2.1'

Dam Below Simsbury R.E.C. Sta 68+00

Before dam failure: Q= 700 cfs; H= 4.0'
[illegible] Road H = [illegible] = 3.2'; depth = 4.0-1.2 = 2.8'

[illegible] 2.7 (4.0/5.3)(700-0.0) = [illegible] [illegible]

After dam failure: Q= 3592 cfs; [illegible]
[illegible] = [illegible] = 1,330 cfs; depth = 12' = 2.0'

[illegible] 2.7 (6.0-5.3)(700-0.0) = 7.[illegible]
[illegible] (5.0-2.0)/2 [illegible] = 5.26 [illegible]

[illegible] = 3555 cfs W 2.1'

No backwater from Stream RE-6.

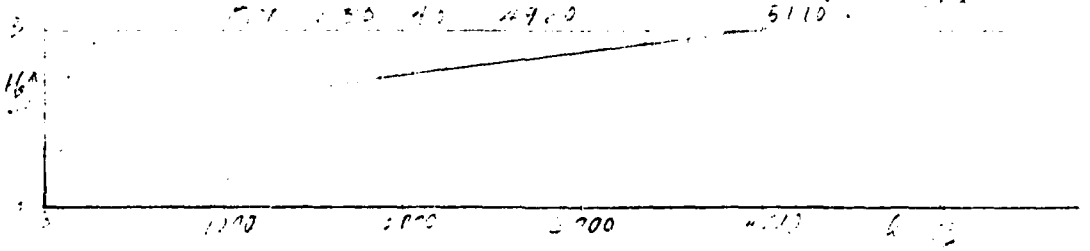
Flow over road $Q = 3.0 L H^{3/2} = 3.0(93) H^{3/2} = 279 H^{3/2}$

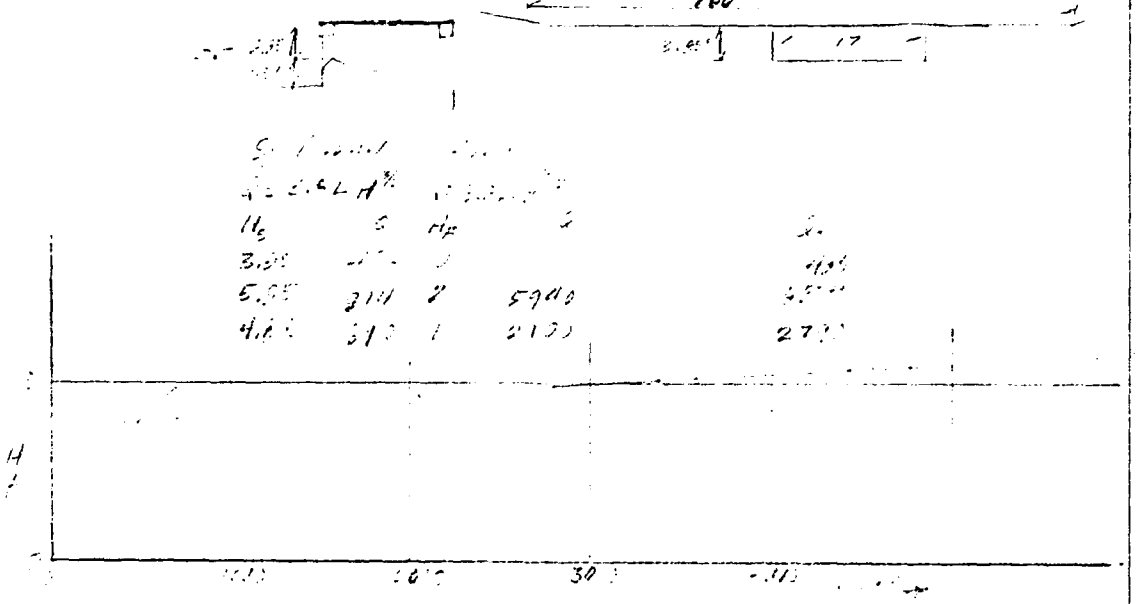
~~[7396 − 279] = 5.35'~~

No backwater from Stream RE-6 will increase the storage to significant.

Spillway

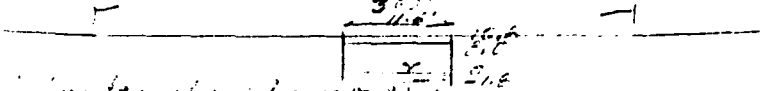
H_s	Q	H_w	Q	Q_T
1.7	32	0	0	32
3.7	121	2.0	17-H	1975
4.7	137	3.0	3223	3359
[illegible]	[illegible]	[illegible]	[illegible]	5110





$H = 5.0$

STA 204.00



Length of double channel = 250.0 + 10.1

No significant storage

Capacity from curves:

$Q = 29$ ft. $= 64.4\left(\frac{29}{150}\right) = 11.0$ kcfs.

$Q = AV = 11.6(2.5)\,11.0 = 1250$ cfs.

~~$Q = 2.27 = 1250 = 2000$ cfs~~

$M = \left(\frac{2Q}{3.0(300)}\right)^{2/3} = \frac{2001}{3.0(300)}^{2/3} = 1.71$ ft.

Depth of flow over road $= 1/2(1.71) = 1.14$ ft

~~Velocity of flow $\frac{1250}{1.14 \times 300} = 3.7$ fps~~

No further storage can be gained by reducing outlet capacity of Spring River below that of the Spring River U.S.G.S. stream gaging station.

Drainage area = 22.2 sq. mi.

Terrain: 700' to 1082' M.S.L.

Limit mountainous zone

20% to 30% hillside slope = 2:1

Headwaters slope = 4.7; mostly = 2:1

Use Manning's N.P.F. curve (#3) coefficient

$Q = 3.5(1400)^{1/2} = 36{,}750$ cfs.

~~Assume 2' rise in stage gathers~~

This will not make significant difference in the maximum flood stage

Some of the small streams or waterways in the drainage basin are shown on the topographic map.

DAM [illegible] TA [illegible] 4/5 Long Point Dam

Altered Reach:

Breach failure: Q = 700 cfs ≤ 1000 cfs [illegible]

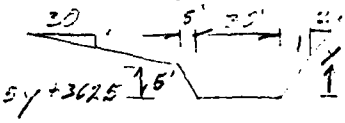
Allo failure: Q = 3558 cfs

[illegible] = 2.8 (3558 − 1000)^2/3 / 3.1(30))^1/2 = 16.2'

depth in [illegible] = 1.57 = 1.25'

velocity = (4/3)(2.8)^1/2 = 6.3 fps.

Standard Reach:



Valley X-section 500' downstream Variable K.I:

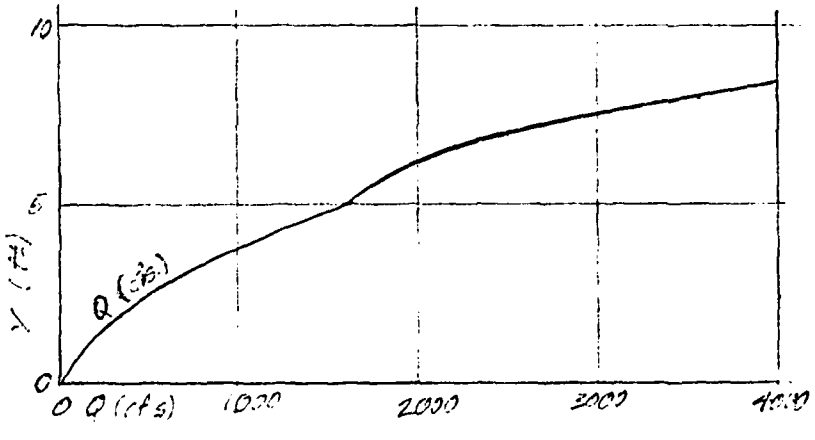
$A = \frac{1}{2}y^2 + 30y + 5y - 0.5 + 2(0.5)(y-0)^2 = 16y^2 - 115y + 3625$

$P = 2.24y + 30 + 7.1 + 30(y-0) = 32.2y - 11^2$

$n = 0.030$ [illegible] = 1000.0

$Q = 1.49/n, S^{1/2} AR^{2/3} = 0.5226 AR^{2/3}$ Reach length = 9000'

Y = 5.0;	Q = 1623 cfs;	A = 182 sq ft	V = 38.6 ft/s
Y = 2.0;	Q = 338 cfs;	A = 66 sq ft	V = 13.6 ft/s
Y = 3.0;	Q = 700 cfs;	A = 106 sq ft	V = 21.9 ft/s
Y = 7.0;	Q = 2504 cfs;	A = 342 sq ft	V = 70.7 ft/s
Y = 8.0;	Q = 3561 cfs;	A = 467 sq ft	V = 96.2 ft/s



$Q_{1.7} = 700 + 2.8(2)^{2/3}\left(\frac{24.0 - 21.3}{1.7}\right) = 700 + 2554 = 3254$ [illegible] Y = 7.7'

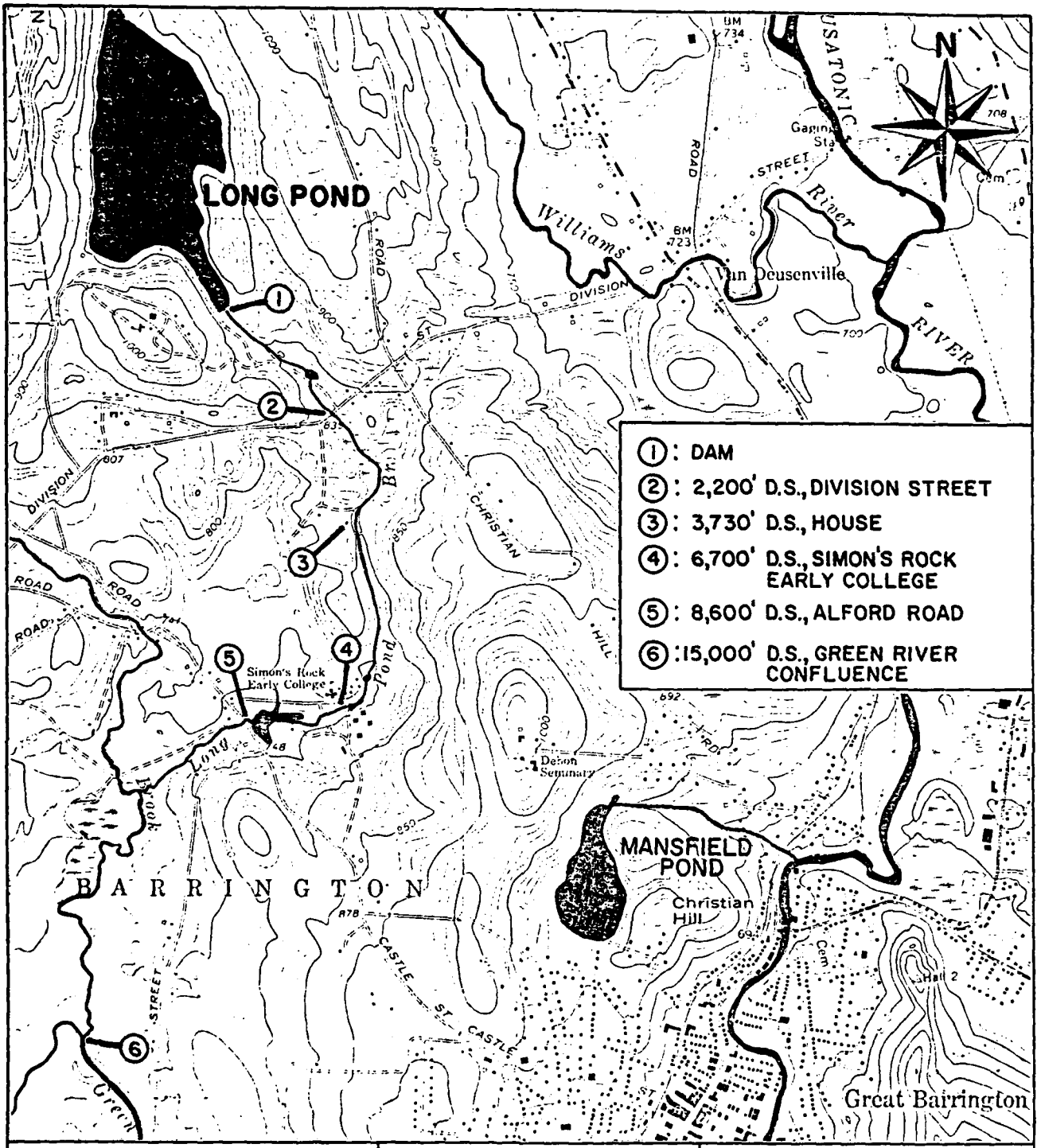
A = 432 sq ft; V = 29.3; $V_{max} = 29.3 + (6.5)(1.5) = 39.1$ fps

$Q_{1.7} = 700 + 2.8(2)^{2/3}(1.7 - \frac{92.9 - 21.3}{7.1}) = 700 + 2045 = \underline{2745}$ [illegible] Y = 7.76'

DOWNSTREAM IMPACTS OF DAM FAILURE

Map Location No.	Distance Downstream from Dam ft	Feature	No. of Habitable Buildings	Before Dam Failure: Flood Stage cfs / ft	Depth over Rdwy ft	Bldgs. Damaged	After Dam Failure: Flood Depth cfs / ft	Depth over Rdwy ft	Bldgs. Damaged	Comments
1	0	Dam	0	700 2.3	—	0	3990 6.11	—	0	
2	2,200	Division St.	3	700 2.3	0.5	0	3990 6.3	1.5	0	Road overtopped at Division St.
3	3,730	Below swamp	1	700 2.3	—	0	3600 5.5	—	0	Little damage, house 1 bldg.
4	5,700	Stanwix Rd. and [illegible]	8	700 2.3	0.7	0	3590 5.4	3.7	3	Damage to roads & some classroom bldgs.
5	9,000	Alford Rd.	3	700 3.0	0	0	3560 6.0	1.3	0	Damage to road by failure
6	15,000	Above Hurlburt Rd.	3	700 3.0	—	0	3270 7.8	—	0	Little damage above Hurlburt St.

DAM FAILURE Summary E/S Misc LONG [illegible]



- SCALE -

1000' 0 1000' 2000' 3000'

FROM: U.S.G.S. EGREMONT, AND GREAT BARRINGTON, MASS. QUADRANGLE MAPS

QUADRANGLE LOCATION

TIGHE & BOND / SCI
CONSULTING ENGINEERS
EASTHAMPTON, MASS.

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

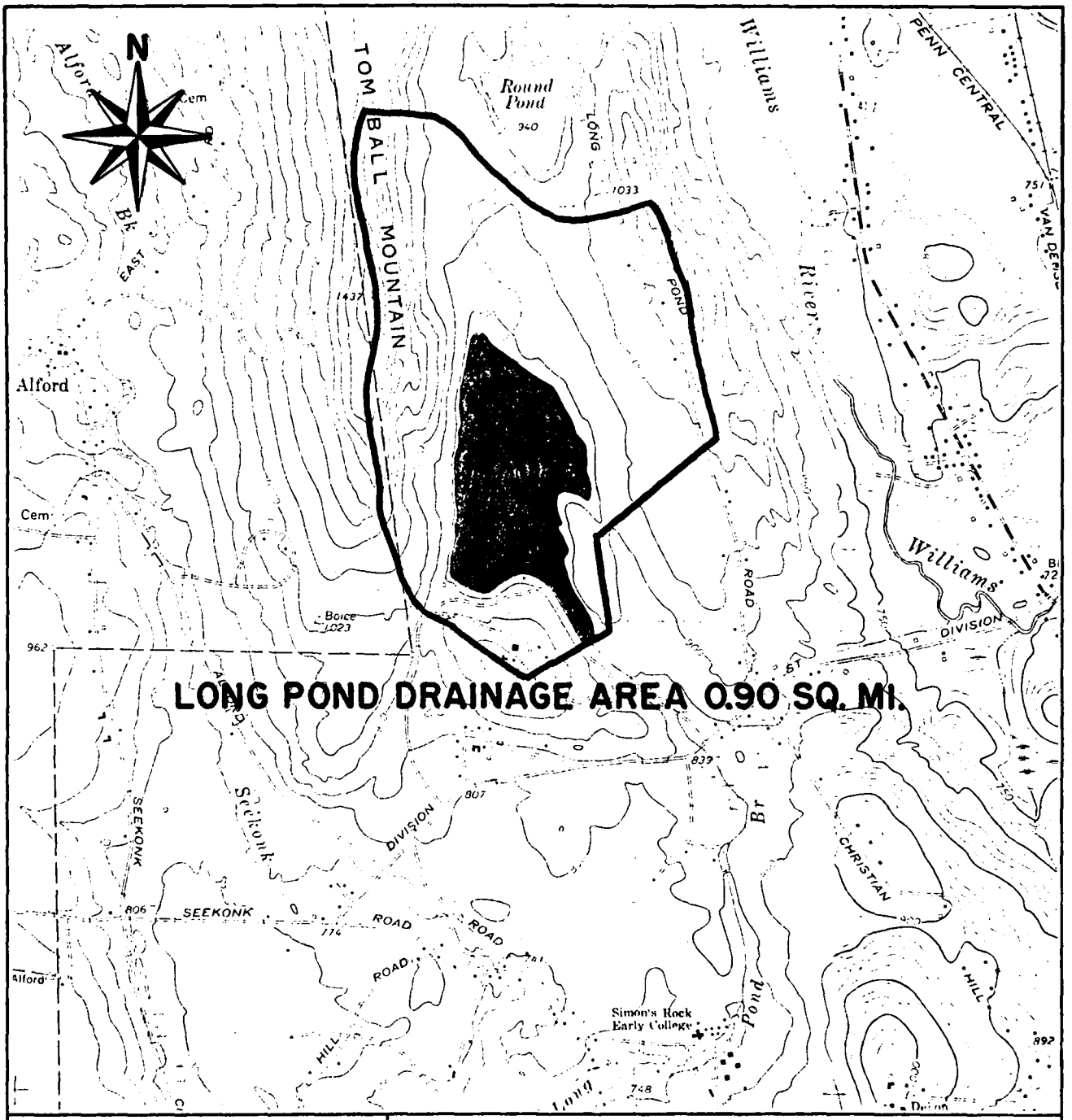
LOCATION AND DOWNSTREAM HAZARD MAP

LONG POND DAM (MA 00024)
BERKSHIRE COUNTY

GREAT BARRINGTON
MASSACHUSETTS

SCALE: AS NOTED

DATE: FEBRUARY 1980



- SCALE -

1000' 0 1000' 2000' 3000'

FROM: U.S.G.S. EGREMONT, AND GREAT BARRINGTON, MASS. QUADRANGLE MAPS

QUADRANGLE LOCATION

TIGHE & BOND / SCI CONSULTING ENGINEERS EASTHAMPTON, MASS.	U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

DRAINAGE AREA MAP

LONG POND DAM (MA 00024)
BERKSHIRE COUNTY

GREAT BARRINGTON
MASSACHUSETTS

			SCALE : AS NOTED
			DATE : FEBRUARY 1980

APPENDIX D

Experience Data

Selected data for locations in the same area as Long Pond Dam:

Reference: Yield of Streams in Massachusetts, Water Resources Research Center, University of Massachusetts, Amherst, Massachusetts.

USGS Water Data Report CT-25-1

Station	D.A. sq. mi.	Discharge cfs/mi^2	Discharge cfs	Date	Record
Green River Gt. Barrington, MA	52.2	40	2,120	3/31/60	1951-62
Reference: U.S.G.S. Water Data Report CT-25-1					
Salmon Creek Lime Rock, CT	29.4	214	6,300	8/19/55	From high water marks
	29.4	44	1,300	12/21/73	1961-1975
Guinea Brook Ellsworth, CT	3.5	91	319	12/21/73	1960-1975
Applied to Long Pond Dam	0.9	440	400	8/19/55	
			5.7		Maximum reported reservoir depth

Flood runoff data indicates that 400 cfs inflow to Long Pond Dam may have occurred in August 1955. The present spillway without flashboard would not pass more than about 140 cfs without overtopping the dam. 250 acre feet of stroage between top of flashboard and top of dam probably reduced the peak sufficiently to avoid overtopping. No reports have indicated that this dam was overtopped at any time.

APPENDIX E

INFORMTION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(9) NAME	(10) LATITUDE (NORTH)	(11) LONGITUDE (WEST)	(12) REPORT DATE DAY | MO | YR
MA	04	NED	MA	003	01				LONG POND DAM	4213.5	7323.3	16FEB80

(13) POPULAR NAME	(14) NAME OF IMPOUNDMENT
	LONG POND RESERVOIR

(15) REGION	(16) BASIN	(17) RIVER OR STREAM	(18) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(19) DIST FROM DAM (MI.)	(20) POPULATION
01	10	LONG POND BROOK	GREAT BARRINGTON	3	7530

(21) TYPE OF DAM	(22) YEAR COMPLETED	(23) PURPOSES	(24) STRUCTURAL HEIGHT (FT.)	(25) HYDRAULIC HEIGHT (FT.)	(26) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	(27) NORMAL (ACRE-FT.)	(28) DIST	(29) OWN	(30) FED R	(31) PRV/FED	(32) SCS A	(33) VER/DATE
FERC	1920	S	16	16	700	520	NED	N	N	N	N	

(34) REMARKS

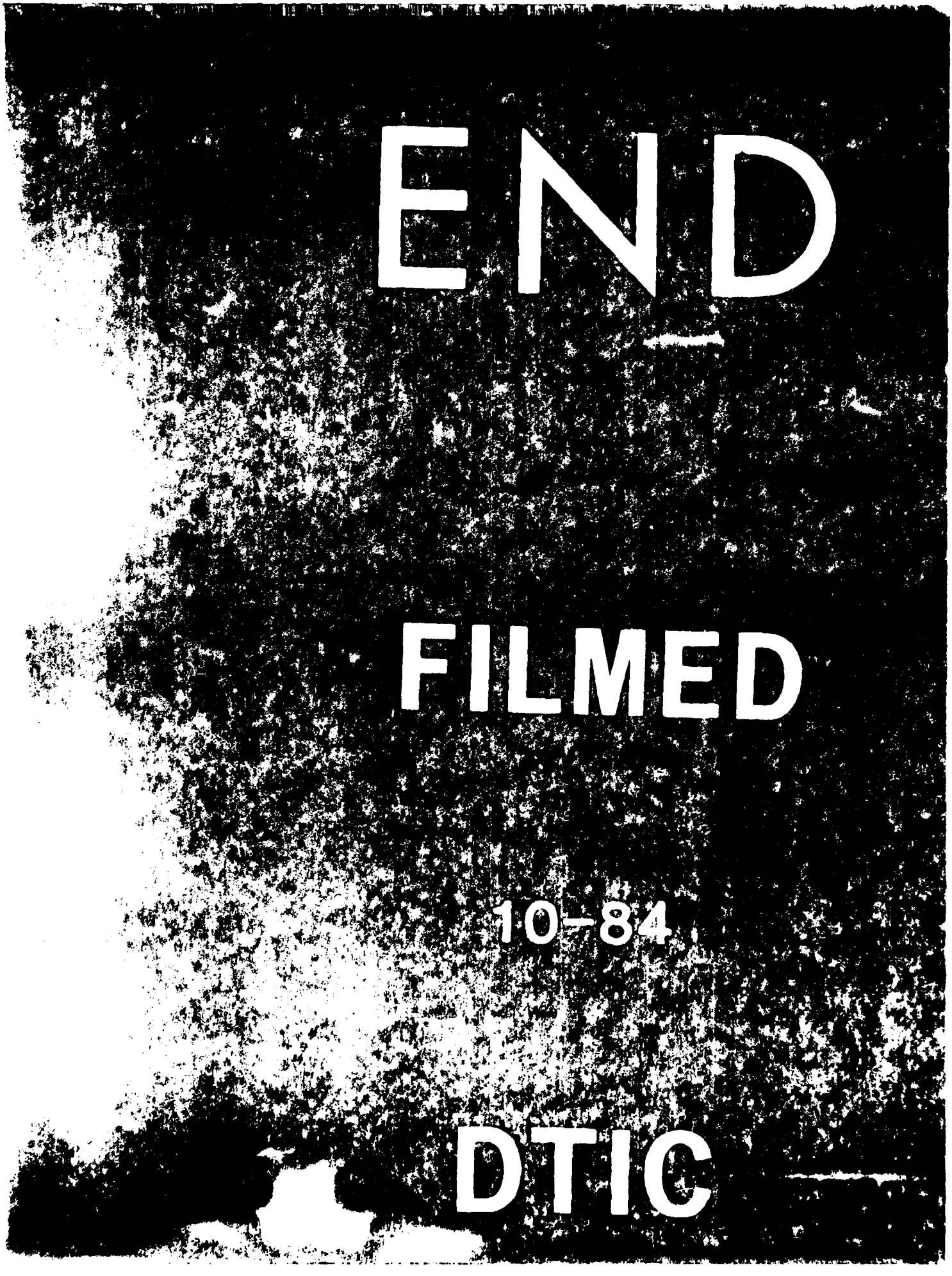
(35) D/S HAS	(36) SPILLWAY CREST LENGTH (FT.)	(37) SPILLWAY TYPE	(38) SPILLWAY WIDTH (FT.)	(39) MAXIMUM DISCHARGE (CFS)	(40) VOLUME OF DAM (CY)	(41) POWER CAPACITY INSTALLED (MW)	(42) POWER CAPACITY PROPOSED (MW)	(43) NAVIGATION LOCKS NO	(44) LENGTH (FT.)	(45) WIDTH (FT.)	(46) LENGTH (FT.)	(47) WIDTH (FT.)	(48) LENGTH (FT.)	(49) WIDTH (FT.)	(50) LENGTH (FT.)	(51) WIDTH (FT.)
2	240	U	10	142	3000											

(52) OWNER	(53) ENGINEERING BY	(54) CONSTRUCTION BY
HOUSATONIC WATER CO	UNKNOWN	UNKNOWN

(55) REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
MASS DEQE DIV WATR	MASS DEQE DIV WATR	NONE	MASS DPW

(56) INSPECTION BY	(57) INSPECTION DATE DAY | MO | YR	(58) AUTHORITY FOR INSPECTION
TIGHE + BOND DIV OF SCI	14NOV79	PL 92-367

(59) REMARKS


END
FILMED
10-84
DTIC